The Refrigeration Service Engineer

Vol. 5
No. 1

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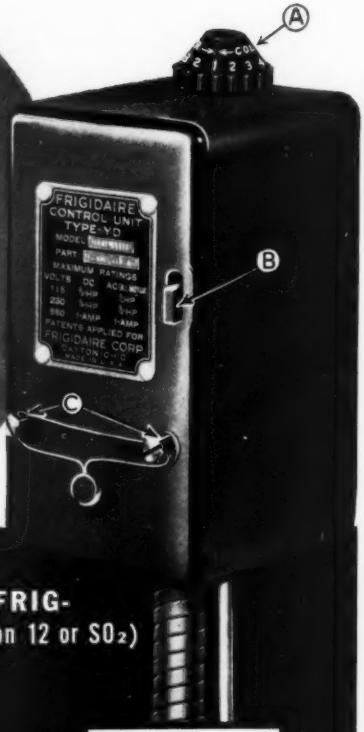

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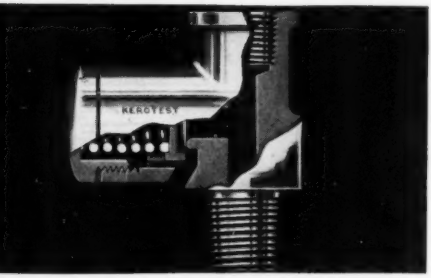

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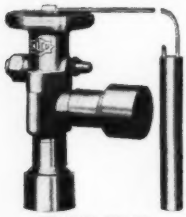

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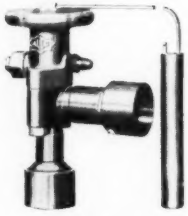

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REFRIGERATION UNITS *and* OIL BURNERS

VOL. 5 JANUARY, 1937 NO. 1

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OFFICIAL ORGAN REFRIGERATION SERVICE ENGINEERS' SOCIETY

VOL. 5, No. 1 CHICAGO, JANUARY, 1937 $2.00 per Annum

Compressor Valves

Here Is a Simple Explanation On Valve Operation Fully Illustrated.

By L. K. WRIGHT, *Mem. A.S.R.E.**

THE valves employed on large refrigeration machines are usually of the simple open or shut type and give but little concern to the refrigeration installer or service man of even slight experience. Perhaps long association with and manipulation of the ordinary water faucet in the home has so firmly rooted the functioning of this simple type of valve in the mind that no thought is given to it.

In refrigeration work the shut-off valve is provided with a packing around the stem to prevent loss of refrigerant or oil. True, water valves are packed as well, but the refrigeration valve is subjected to a fluid which cannot be wasted and therefore additional thought has been given in this matter of packing.

Some compressors are equipped with simple shut-off valves. In some cases only one valve is found, acting as a discharge shut-off valve on the compressor. A better type of compressor will be found equipped not only with a discharge shut-off valve but also with a suction shut-off valve. Further refinement would include another pair of valves to which gauges could be attached for reading pressures, or which would offer a means of servicing the unit.

Simple Two-Way Valve

Figure 1 illustrates the simple two-way valve, a type commonly found on small systems. At the left in this illustration is shown a section of this type of valve. It will be observed that manipulation of the stem will cause the valve end to open or close the opening A of the valve. The preferred direction of fluid travel through such a valve is from A to B.

In the sectional view given of a shut-off valve the gasket employed will be observed to be of the flat, internal variety, being used with an acorn cap to prevent loss of refrigerant.

The second illustration in Fig. 1, labelled "with seal cap," illustrates another type of gasket, this one usually being composed of a ring of copper containing an asbestos core. The third valve shows a new seal cap which is coming into extensive use. This type is provided with wings or lugs and does not require a wrench for its removal. By re-

*Senior Instructor of Refrigeration Course Y.M.C.A. Trade & Technical School, New York City.

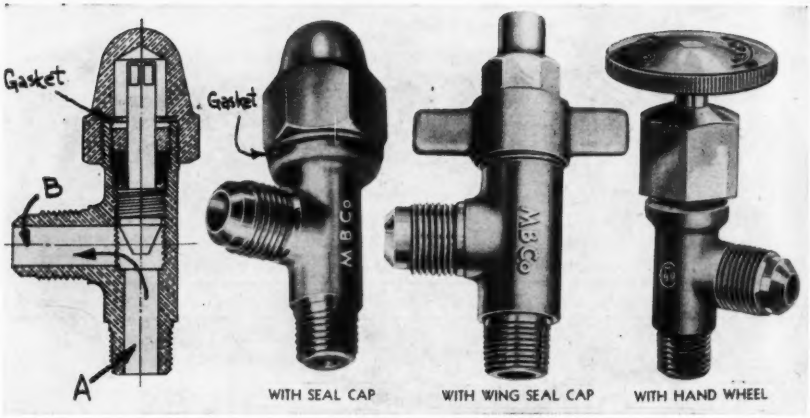


FIG. 1. SIMPLE TWO-WAY VALVE.

versing the cap a valve wrench is had, a very convenient arrangement especially where a number of valves of different sizes are encountered. Each valve, of this type, has its own valve key and will be found advantageous in the event of a bad refrigerant leak when speed in closing certain valves is of paramount importance.

The first three illustrations of Fig. 1 are of valves which use inside packing nuts. This type is slotted and a hollow wrench with two extending edges or fingers must be used to remove or tighten the packing nut. The last illustration in Fig. 1 shows a valve equipped with an outside packing nut. This nut must be kept tight and the packing under compression, otherwise leakage will result, as no seal cap is used in this,—the older, design.

The System

Students undertaking the study of refrigeration and refrigeration apparatus should make sure they know just how the refrigerant circulates through a compression system.

A study of Fig. 2, which diagrammatically illustrates an automatic constant pressure expansion valve system, will serve to bring out the relative positions of the various parts of the apparatus. The direction of refrigerant flow through the system can be traced by the directional arrows. The condition of the refrigerant, that is, whether it is in the vapor or liquid phase, can also be checked by reference to the diagram.

The compressor diagrammatically shown in Fig. 2 indicates one equipped with the standard valves generally used on household and small commercial designs.

The Compressor

Most beginners have a great deal of trouble tracing the flow of refrigerant through the compressor, especially if the standard 3-way valve is present.

To assist the tyro the author has used a sliding arrangement on the valves so that flow can be visually noted, both through service valves and compressor. The student is first referred to Fig. 3, which shows a cross-section of a typical small unit type of compressor.

Refrigerant vapor is drawn into the compressor crankcase to allow entrained oil to drop to the bottom of the crankcase and then passes the suction valve in the piston, when the latter is on the downward or suction part of its stroke.

As the suction valve, in many cases, consists of nothing more than a thin disc of steel about the size of a ten cent piece many service men have adopted the term of "dime" valve for this part. This dime valve is generally free to "float" in its restricted space. On the downward or suction stroke gas lifts the suction or dime valve and low pressure vapor from the evaporator is

FIG. 2. AN AUTOMATIC CONSTANT PRESSURE EXPANSION VALVE SYSTEM.

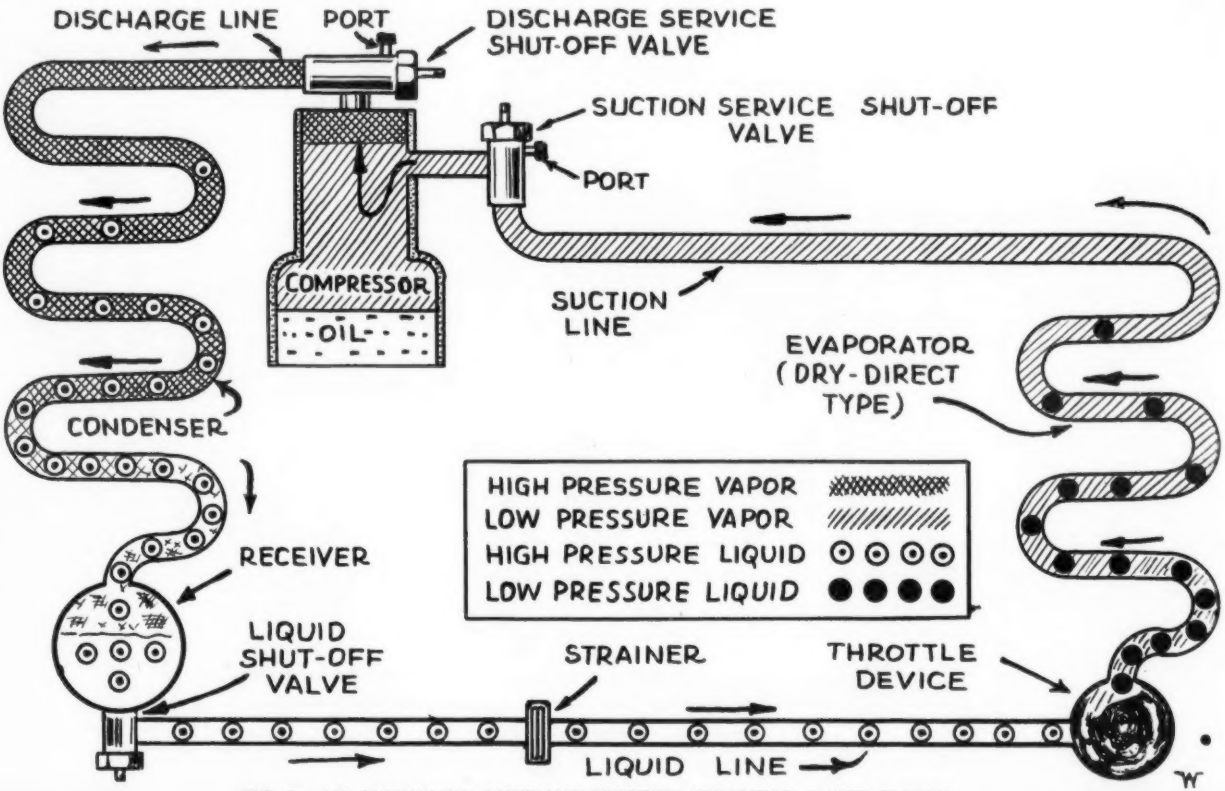


FIG. 2. AN AUTOMATIC CONSTANT PRESSURE EXPANSION VALVE SYSTEM.

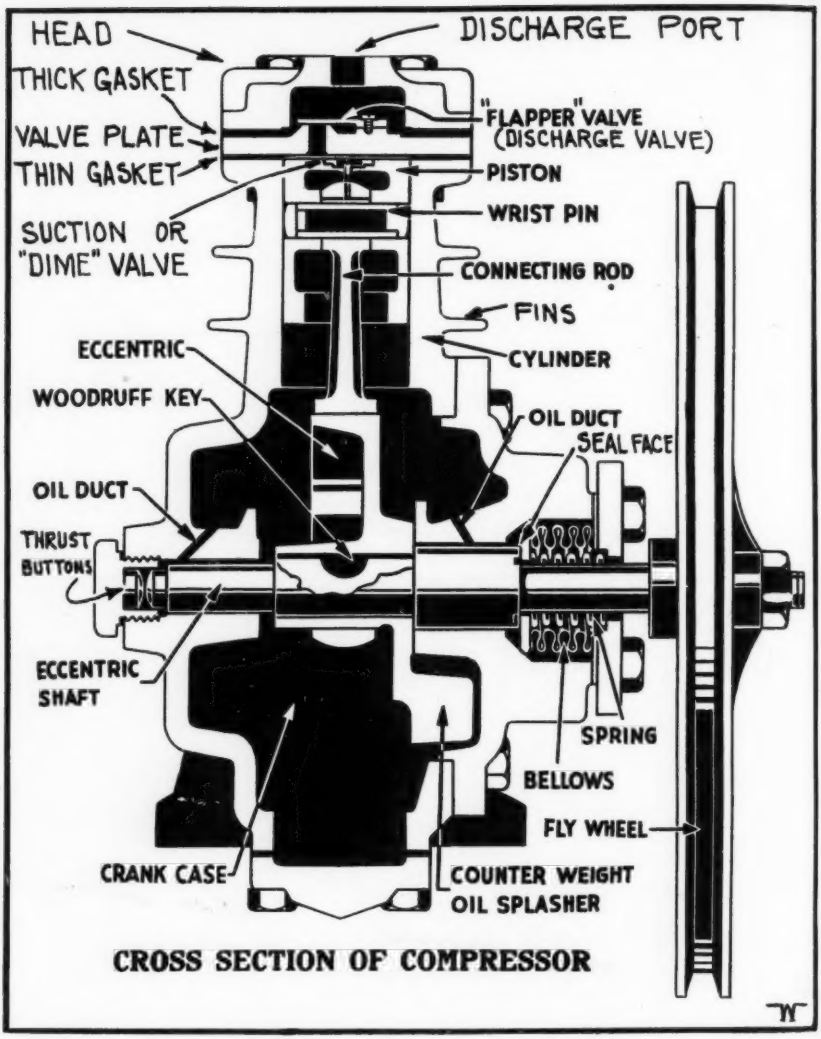


FIG. 3. CROSS-SECTION OF A TYPICAL SMALL UNIT.

drawn into the compression space of the cylinder.

The upward or compression stroke of the piston squeezes or compresses the entrapped vapor, converting it into high pressure vapor. As soon as sufficient pressure has been imposed, the discharge or "flapper" valve lifts and allows the high pressure gas to enter the head of the compressor and to flow to the condenser.

The parts of a standard compressor of the eccentric type are clearly indicated and shown in Fig. 3. The word compressor is not a very informative name for this important part of the compression system, for it really has three major duties, viz.: suction,

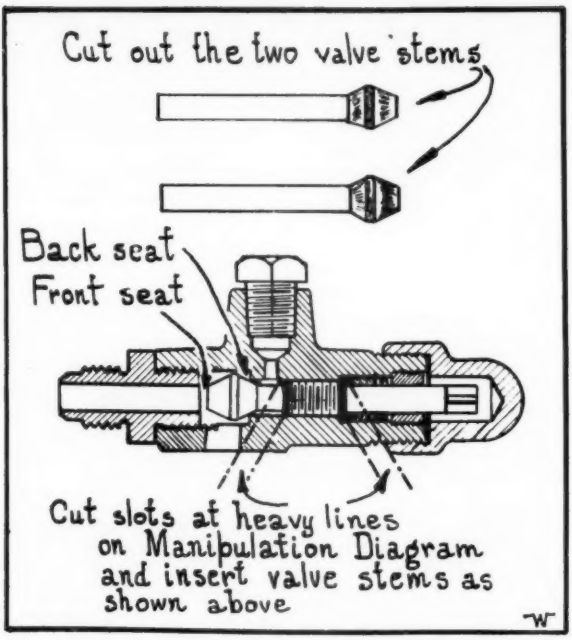


FIG. 4. CUT OUT VALVE STEMS AND FIT IN VALVES IN FIG. 5.

compression and discharge of refrigerant vapor. Each of these functions is just as important as the other, for if one function be faulty the entire system will suffer. In theory, the compressor also serves to divide the high from the low side.

Operation of Compressor Service Valves

During service operations it will be necessary to manipulate the service valves on the compressor. To visualize operation the student should trace or cut out the pair of valve stems shown at the top of sketch 4.

These stems are to be inserted in the valves diagrammed in Fig. 5 in the manner illustrated in Fig. 4. This latter figure shows the points at which to cut slots in the valve diagram. The stems are inserted so that both ends are visible, the middle of the stem body being under that part indicated as threading.

With the valves in Fig. 5 slotted and provided with the slideable stems cut from or patterned after those shown in Fig. 4, the compressor valve manipulation diagram is ready to use.

When the stem of a three-way compressor valve of standard design is screwed in all the way, it is said to be front seated. By unscrewing the stem, so that it is out of the valve to the furthest extent it is said to be back seated. Front and back seats are indicated in Fig. 4 and in Fig. 6 as well.

The main side opening, generally flanged, remains open at all times, regardless of the position of the valve stem. Manipulation of the valve stem only affects the main end opening or the service port or opening. Back seating seals off the latter, leaving the flange or main side opening and main end opening wide open to each other.

Front seating cuts off the main end opening, so that nothing can leave or enter it. In this case the service port and main side opening are wide open to each other.

Try moving the valve stems inserted in the compressor valve manipulation diagram (Fig. 5) and check direction of flow under

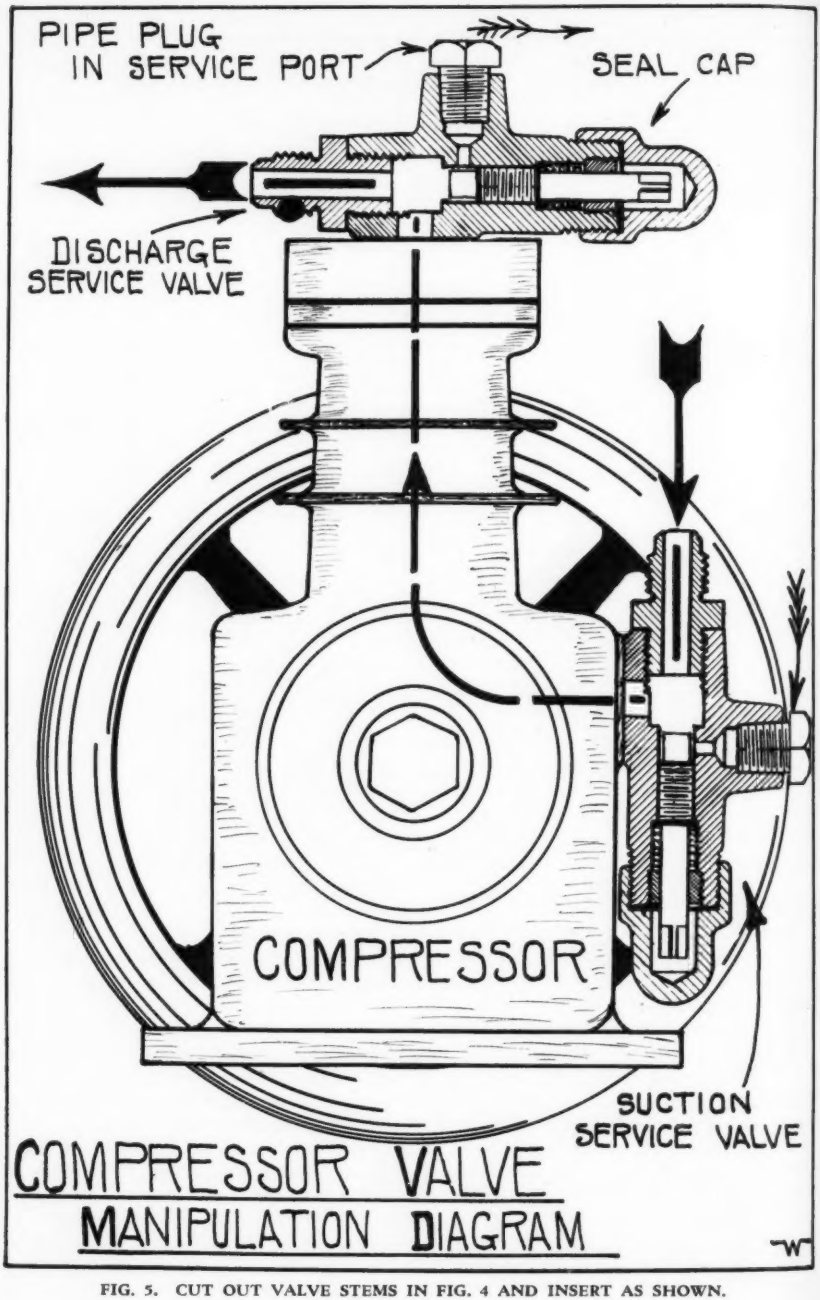


FIG. 5. CUT OUT VALVE STEMS IN FIG. 4 AND INSERT AS SHOWN.

different settings. In normal use, both discharge service and suction service valves are back seated. Flow of refrigerant would be as shown in Fig. 2 and as shown by the heavy arrows in Fig. 5.

In the field the service man makes use of these service valves. They are included in the machine design for this specific purpose and in order to service a machine the worker must know how to operate the service valves.

Checking Pressures of Systems

If the system is to be checked for correct charge, presence of air or where the low side setting on the automatic constant pressure expansion valve is to be determined, the worker must first attach his gauges or gauge test set.

To attach a gauge to either service valve place a tee wrench on the end of the stem and turn so as to screw in stem. If stem jumps off back seat it had been back seated. If stem turns easily valve was left with stem off back seat. In either case unscrew stem until it is all the way out or back seated. This cuts off communication of the service port with either main side opening or main end opening, both of the latter being wide open to each other.

The pipe plug in the service port of the service valve may now be unscrewed and the gauge screwed directly into the port or a half union may be inserted so that a copper tube connection can be made to the port.

To obtain a gauge reading all that is necessary is to "crack" the service valve off its back seat. To "crack," refers to lifting the valve slightly off its seat.

If the gauge hand is "jumpy," valve is cracked too far off seat and if the hand is "dead," that is, motionless, valve has not been opened sufficiently to get a correct reading.

To remove gauges merely back seat valves and unscrew gauges. Replace pipe plugs in the service openings.

To Charge

Where a suction service valve and a discharge service valve exists on the compressor of a small refrigerating system, such apparatus is generally charged by the gas method.

To charge by this method the suction service valve is first tested by applying tee wrench and screwing in valve stem. If it jumps off back seat return to back seat. If the stem revolves easily, indicating valve left off back seat, stem should be unscrewed to back seat. Such procedure should be followed. If the worker merely applies a tee wrench and tests the valve by attempting to back seat an already back seated stem he will strain the stem and it will probably twist off. Test valve as indicated and there will be no broken valve stems.

With suction service valve back seated, remove pipe plug; insert half union; tie on copper tube and refrigerant cylinder. For detailed explanation of procedure see "Field Methods of Charging Refrigeration Apparatus" in the December issue.

Inasmuch as refrigerant is to be removed from the cylinder and the compressor must be prevented from drawing vapor from the evaporator, the suction service valve must be front seated, i.e., stem in all the way. Refrigerant vapor will be drawn in through the service port and pass through the main side opening to the compressor. No vapor can enter from the main end opening.

To Discharge a System

Where all or part of the refrigerant is to be pumped out of a system, a gauge is usually inserted in the service port of the suction service valve and this valve left off back seat. Reduction of pressure to a high vacuum indicates all refrigerant out of the system, hence the need for this compound gauge.

To discharge the refrigerant from the system the worker usually connects a line from the service port of the discharge service valve to an empty cylinder or has the end of the line extending out doors if he is merely desirous of emptying the system and not in saving the refrigerant.

The discharge service valve stem is then front seated (stem in all the way). Thus the main end opening is closed and no fluid can enter or leave at that point. Refrigerant will be discharged out of the service port when the compressor is operated. By allowing the compressor to operate until a 25 or 30 inch vacuum is held the system can be evacuated of all refrigerant.

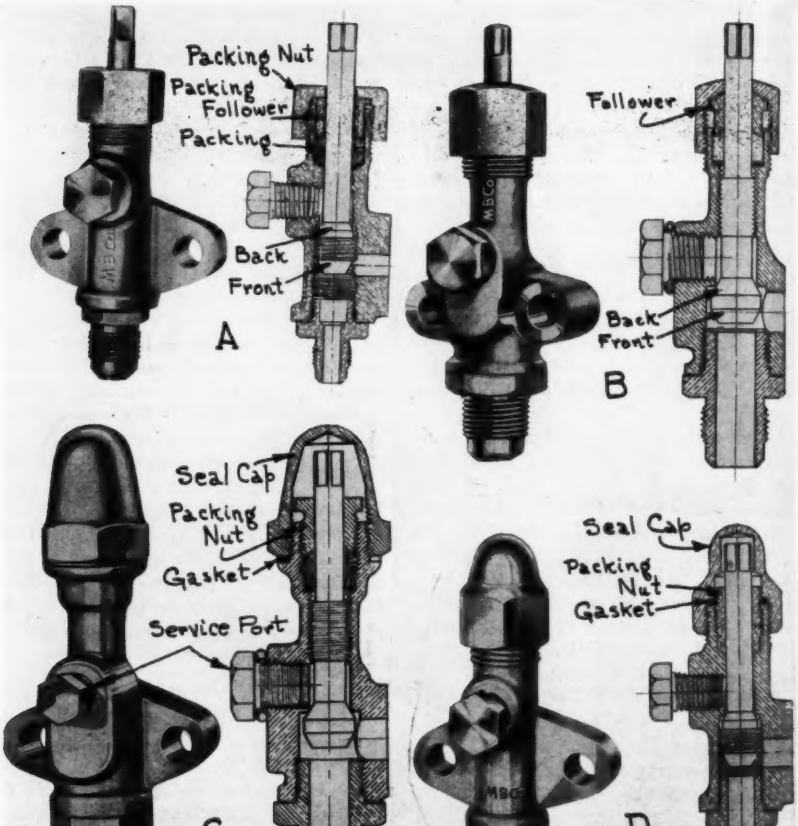


FIG. 6. VARIOUS TYPES OF SERVICE VALVES.

To Bleed Air from System

To bleed air out of a system where this foreign gas is indicated, such as by high head pressure, stop the compressor and allow the system to remain idle for about ten minutes. Then remove pipe plug from service port of discharge service valve, first testing to make sure stem is back seated.

By lifting stem off back seat slightly air will rise out of the condenser and make its exit at the service port. Do not open valve wide off the back seat. Merely crack it and allow the air to bleed out slowly. If an attempt is made to blow air out fast a great deal of refrigerant will be lost, whereas by bleeding very little escapes with the air.

Types of Valves

Various types of compressor service valves are shown in Fig. 6.

In A, the outside packing nut type is depicted. The packing nut in this case provides pressure on a packing follower with a flat end.

The valve shown in B uses a round end packing nut and has the threading on the valve stem in the center of stem proper,

while in A the threads are shown located between the two seat surfaces.

The valve C is equipped with a seal cap which rests on a gasket to prevent leakage from the valve. The inside packing nut employed in this valve has a hexagonal head and if it requires tightening use a 12-point wrench to do so. Incidentally, use 12-point wrenches wherever possible, such as on the outside packing nuts and seal caps.

Valve D uses a packing nut with two flat sides, so that an open end wrench may be used to tighten it.

The valves shown in Fig. 1, make use of an inside packing nut with a slot in the crown so that a packing nut wrench must be used to tighten them.

If students of refrigeration will take the trouble to make the sliding inserts and use them on the diagram they will secure visual assistance in determining just what occurs with different valve manipulations. The student who knows beforehand just what the path of travel will be under certain valve settings will have a head start over the worker who does not comprehend valve manipulation and what change in flow has taken place in consequence of such manipulation.

How to Determine Suction Line Sizing

Proper Size for Suction Lines Is Essential in Air Conditioning Work. Here Are Suggestions as How to Figure the Suction Line Size.

By GEORGE H. CLARK, B. S., M. E.*

IN the last few years since summer air conditioning equipment has been developing very rapidly in sizes suitable for homes and small to moderately sized stores or business places, a considerable amount of refrigeration equipment has been used; and to a large extent, the size of suction line has been determined largely by guess. In some cases the guesses as to size of suction line were so low that it was found necessary, in order to get proper operation of equipment, to install additional suction lines to eliminate an excessive drop in pressure from evaporator to compressor.

I have been trying to obtain some definite information with respect to the proper sizes of suction lines to be used but have obtained very little real information in that line. I have found from practice that for Freon, if we limit the velocity of our gas in the suction line to 1000 feet per minute per inch of diameter, the drop in pressure is not excessive if the lines are not over 50 feet long. With longer lines it may be advisable to limit our velocity to a still lower figure. With methyl chloride and sulphur dioxide, however, we can allow a higher gas velocity with the same drop in pressure.

I have tried to co-ordinate good practice in the flow of other vapor fluids with my actual experience in connection with the size of suction lines in refrigeration and air conditioning jobs. I have worked out a set of curves which may be of some value in estimating the size of suction line used until some better information is available. The accompanying curves have three principal figures in connection with their use. The vertical line at the left side of the diagram gives the tons of refrigeration corresponding to the capacity of the condensing unit. The figures on the bottom horizontal line give the cubic feet per minute of gas through the suction line for these various tonnages of refrigeration, while the figures on the right vertical line indicate the proper suction line diameter in inches.

*President, Detroit School of Refrigeration. Chairman, Educational and Examining Board, R.S.E.S.

Figuring Freon

In order to determine the number of cubic feet per minute of Freon to be circulated for any number of tons of refrigeration and at a 40° evaporation temperature, locate the tonnage figure on the left vertical scale and proceed horizontally to the straight line labeled F-40. This stands for Freon at 40° evaporation. Then proceed vertically downward from the junction point of F-40 and the tonnage refrigeration required and you will find the number of cubic feet of Freon which would be circulated per minute for that tonnage of refrigeration. In order to determine the size suction line to use, proceed horizontally from the intersection of this C-F-M figure and the curve labeled Freon-1000 to the right hand side of the sheet, which will give the proper inside diameter of the suction line.

If it is desired to find the suction line size for Freon when it is to evaporate at 20° or 0°, we would proceed from our tonnage figure to our F-20 or F-0 lines and then vertically on the cubic foot per minute line to the Freon-1000 curve and then horizontally to the right, which would give us our proper size of suction line.

Other Gases

The lines M-40, M-20 and M-0 are for use in conjunction with methyl chloride systems having evaporating temperatures of 40°, 20° and 0° respectively. The curve labeled SO_2-Methyl-1400 is to be used when determining the size of lines required for methyl chloride.

Likewise the size of suction line required for an SO_2 refrigerating system at these various refrigerating temperatures may be determined by referring to the S-40, S-20 and S-0 lines and to the curve labeled SO_2-Methyl-1400.

The information compiled in these curves is based on the following conditions:—the refrigerant entering the expansion valve at a nominal temperature of 80° in all cases; the refrigerant leaving the evaporator in the saturated condition in all cases; and the refrigerant entering the compressor or, in other words, passing through the greater part of the suction line, at a temperature of 60° F.

The Freon-1000 curve is worked out from determining the cross sectional area of tubes of varying diameter in square feet and multiplying this by 1000 feet per minute per inch of diameter, which gives the cubic feet per minute passing through the tube per inch of diameter. Likewise the SO_2-Methyl-1400 curve is worked out in the same manner except that the velocity is taken as 1400 feet per minute per inch of diameter.

The number of cubic feet per minute of the various refrigerants which have to be circulated per ton of refrigeration was found by dividing 200 B.t.u.'s per minute (which equals one ton of refrigeration) by the difference between the heat content of the saturated refrigerant at the various evaporation temperatures and the heat content of the liquid at 80°. This gives us the number of pounds of refrigerant which have to be circulated per minute. This in turn is multiplied by the number of cubic feet of refrigerant per pound at the various saturation pressures and at temperatures of 60°; in other words, the refrigerant is taken as being superheated in each case as it passes through the suction line.

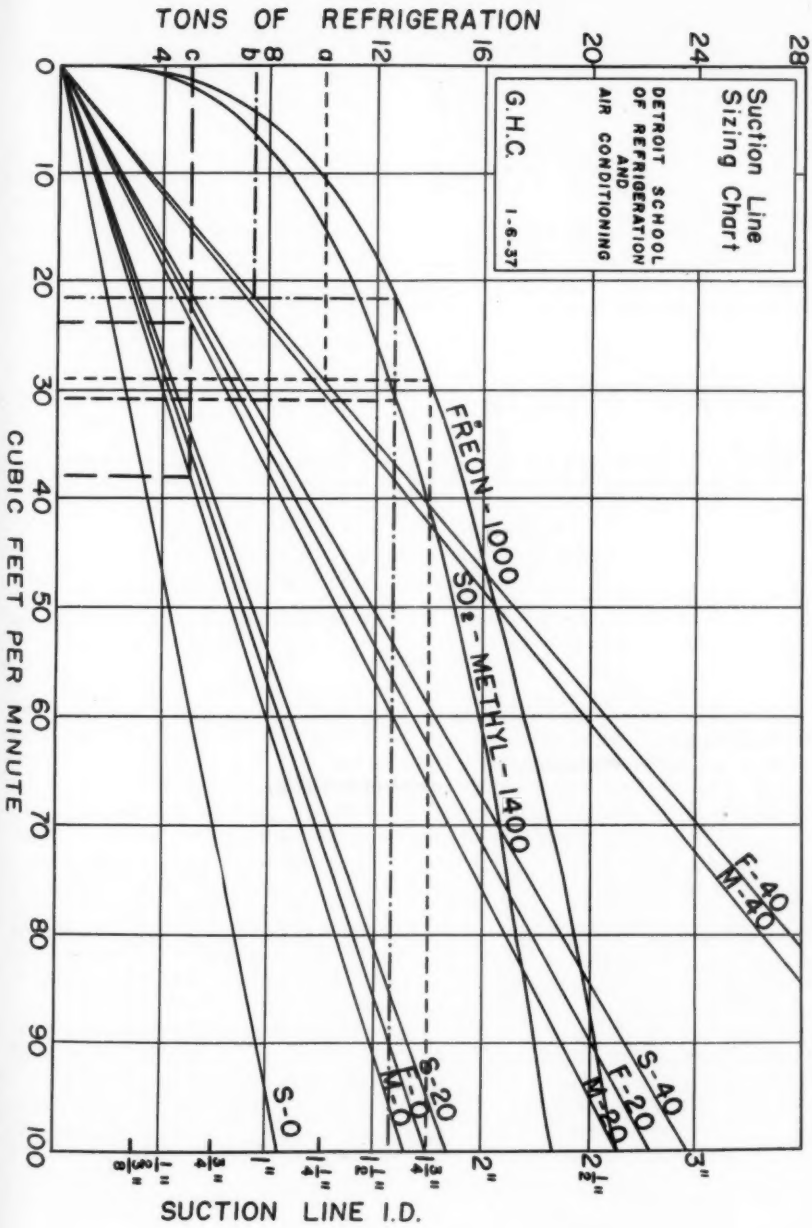
It is recommended that the sizes of suction line determined by use of these curves be used for lines not over fifty feet in length. Where the length of suction line exceeds fifty feet in length, it is recommended that the next larger size of suction line be used.

Use of the Chart

(a) The dotted line on the sheet shows the determination of the size suction line required for a 10 ton Freon job using a 40° evaporation temperature, in which case following from the 10 ton figure at the left to the F-40 line, we come to a vertical line which indicates that approximately 29 cubic feet per minute of Freon would have to be circulated for this size of job; and proceeding upward on this vertical line to the F-1000 curve, we find that the suction line is indicated as being just 1¼" in diameter. If the line is less than 50 feet long, we will find that 1¼" will be ample. If the line is extremely long, say 100 feet or more, a 2" line would be specified.

(b) If we were to determine the size of suction lines for a 15 ton Freon job at 40°

CUBIC FEET PER MINUTE


TONS OF REFRIGERATION
Suction Line Sizing Chart
DETROIT SCHOOL OF REFRIGERATION AND AIR CONDITIONING
G.H.C. 1-6-37
CUBIC FEET PER MINUTE
SUCTION LINE I.D.
FREON-1000
SO2-METHYL-1400
F-40
M-40
S-40
F-20
M-20
S-20
F-0
M-0
S-0

evaporation temperature where two lines are to be used, divide the tonnage by the number of suction lines. This indicates 7½ tons per suction line. From 7½ on the left horizontally to F-40, we see indicated a circulation of about 21.7 cubic feet per minute and at this rate and the intersection with the Freon-1000 curve we proceed horizontally to the right indicating a tube size of slightly over 1½" diameter each.

(c) If we desire to find a suction line for a single suction line methyl job of 5 tons capacity at 10° evaporation temperature, we follow the 5 ton line horizontally to M-20 where we have indicated a flow of 24 C.F.M., and to M-0 where we have indicated a flow of 38 C.F.M. Averaging these we get $\frac{24+38}{2} = 31$ C.F.M. At 31 C.F.M. and the intersection with SO_2-Methyl-1400 we proceed horizontally to the right, indicating a line slightly over 1½" in dameter. That is, to obtain a suction line size for evaporation temperatures between those indicated, interpolate the C.F.M. at the desired refrigeration temperature and proceed as before.

Second Article

Electronics for Servicemen

A Continuation of Our Study of Electronics from the December Issue. The Function of Various Electrical Instruments.

By WALTER G. CHRISTIE, B.S.E.E.

WHEN current passes through a resistance, heat is generated in the resistance. This heating effect is made use of in many control circuits used in heating and ventilating and in refrigeration.

The Common Fuse

The most common use of this principle is found in the common house fuse. The fuse has a specific resistance. This resistance varies for the different size fuses. Thus a 5 ampere fuse would have more resistance than would a 10 ampere fuse. Let's make use of the fundamental formulas we used in last month's article to see how the resistance of fuses varies with the ampere rating.

We found that the heat generated in a resistance is given by the formula:

$$H = A^2RT$$

Where H is heat in B.t.u.
A^2 is (amperes)
R is resistance in ohms
T is time in seconds

A 10 ampere fuse will require the same amount of heat to melt the fuse link as will a 5 ampere fuse. (This is not strictly true over a wide range, but will serve for the purpose of illustration.)

Hence we can write:

$$H_{5A} = H_{10A}$$
$$(I^2R)_{5A} = (I^2R)_{10A}$$
$$(5)\ (5)\ (R_{5A}) = (10)\ (10)\ (R_{10A})$$
$$25R_{5A} = 100R_{10A}$$
$$R_{5A} = 4R_{10A}$$

or for *this particular case*, the resistance of a 5 ampere fuse is 4 times that of a 10 ampere fuse.

The Heat Element in Switches

Almost every thermostatic switch in use today relies upon the generation of heat principle to protect the motor in case of harmful overloads. In most switches, a resistance coil surrounds a spindle to which is soldered a small cog. The cog engages a lever arm and holds the switch contacts closed.

The resistance coil is connected in series

with the switch contacts so that all the motor current passes through the coil. See Figure 1. When an overload occurs, the motor draws more current than it does normally. As a result, the resistance coil gets very hot. When the overload is great enough, the coil melts the solder on the cog and the cog spins around on the spindle, allowing the switch lever to open the switch

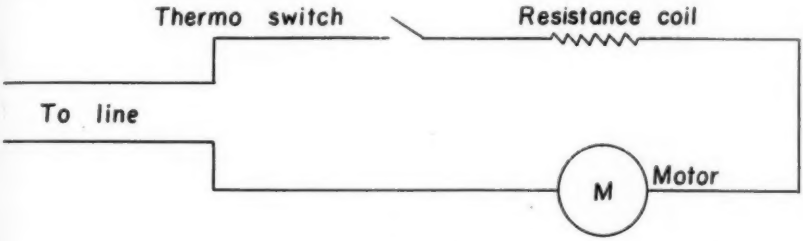


FIG. 1
All Motor Current Must Pass Through the Resistance Coil. When an Overload Occurs, This Coil Gets Hot and, Through a System of Levers, Opens the Thermo. Switch.

contacts and stop the machine. In about 2 minutes the cog cools off and the solder holds it to the spindle again. In order to start the machine, the switch lever must be reset on the cog. This is done by turning the switch to the "on" position.

Because there is *no direct contact* between the heater coil and the spindle, the heater element has to heat the *air* around the spindle in order to make the cut-out function. Hence, if a heavy overload occurs, it will take several seconds before the cut-out can act. This is a *desirable feature* because a refrigerating mechanism is always subjected to considerable overloads at certain intervals. Take, for instance, when a machine has been defrosted in hot weather. The back pressure will be abnormally high for several minutes and, as a result, the motor will be overloaded. If the overload switch functioned too rapidly, the machine would stop before it got into an operating condition. However, if something goes wrong with the liquid control valve so that the abnormal back pressure continues, the heater element will shut down the job and thus save the motor.

It might be well to point out at this time that a motor protector is used to prevent the motor from becoming overheated due to high motor current. The same basis formula applies to heat generated in the motor as applies to heat generated in a resistance. That is:

$$H = I^2RT$$

Because the heat generated depends upon time as well as upon resistance and current, the motor can be greatly overloaded for short periods of time without harm to itself, or it can be slightly overloaded for a long period of time without harming itself.

Because of its time lag or time delay, the heater type motor protector is ideally adapted to refrigeration requirements and is almost universally used today.

When installing a new switch on a job or when changing from one type motor to another (a.c. to d.c. or vice-versa) the serviceman should check the size of the heater element to insure proper motor protection. In fact, if a d.c. motor is replaced by the same size a.c. motor, the switch will keep shutting the machine off because the a.c. motor takes more current than does the d.c. motor.

Most manufacturers recommend that a heater element with a capacity 20 per cent higher than the motor name plate current be used. For instance, if the name plate of a machine reads as follows:

110-220 volts 60 cycle AC
3.8-1.9 amperes 1/5HP single phase

we would figure as follows:

For 110 volt operation
20% of 3.8 is (3.8) (.20) = .76
Heater element should be
3.8 + .76 = 4.56 amperes

For 220 volt operation
20% of 1.9 is (1.9) (.20) = .38
Heater element should be
1.9 + .38 = 2.28 amperes

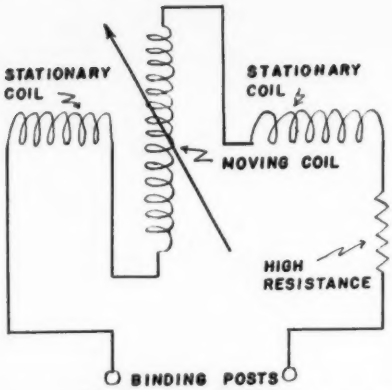


FIG. 2—A.C. VOLTMETER

An A.C. Voltmeter Can Be Used to Measure D.C. Voltage, *But a D.C. Meter Will Not Work on A.C.* A Voltmeter is Connected *Across the Voltage to Be Measured, Never in Series with It.*

The Frigidaire Anti-Freeze Switch

The 1936 model Frigidaire machines make use of the heat generation principle for a novel purpose. That is, a one watt resistor is located inside the switch to heat the air around the switch contacts to prevent the switch contacts from freezing shut. The resistor is in series with the motor.

On these models the switch is located inside the freezer and is therefore always at below freezing temperatures. On the original Frigidaire sealed unit jobs, the switch was also inside the freezer. However, much trouble from frozen switches caused the company to recommend moving the switch to the outside of the cabinet. The heater element inside the switch eliminates the difficulty of frozen contacts.

Incidentally, while speaking of this model Frigidaire, it should be pointed out that the motor overload protector is located in the starting relay which is located under the cabinet. For a complete description of this protector and of the relay itself, refer to the September, 1936, issue of the REFRIGERATION SERVICE ENGINEER, page 12.

Electrical Instruments

There are 3 common instruments used in testing the electrical circuit of refrigerators.

1—voltmeter
2—ammeter
3—wattmeter

The serviceman should know how each meter is built so that he can understand how to connect it properly.

The Voltmeter

The voltmeter is used to measure electrical pressure. It corresponds to the pressure gage of the refrigeration circuit. The voltmeter is constructed as shown in Figure 2. (For simplicity's sake, all meters shown are d.c.) A small coil of fine wire (*2B*) is suspended between the 2 poles of a horseshoe magnet. The coil is connected in series with a high resistance (*2A*). The voltmeter is connected *across* the voltage which is to be measured *not in series* with it. See Figure 3.

In Figure *3A*, the voltmeter is connected to read the line voltage. In *3B* it is connected to read the voltage drop across the resistor *R*. In Figure *3C* it is connected to read the voltage across the motor. The sum of readings *B* and *C* should be equal to reading *A*.

The voltmeter is primarily used to locate causes of low voltage. If a job has continuous motor trouble, there is a possibility that low voltage is to blame. To check for this, connect the voltmeter across the motor lead wires and take a reading.

Suppose the meter reads 90 volts instead of 115 volts. Connect the meter across base plug of a household job *while the machine is operating*. (It may be necessary to install a triple tap in order to do this.) If the voltage checks 115 volts here (while the machine is running), check for a poor connection in the switch or at the base plug.

However, if the voltage is low at the base plug, test the voltage at the panel board. If the voltage is 115 volts here, check for a poor connection somewhere along the line. If none can be found, the line must be too small for the job. Install a heavier line.

If the voltage is low at the panel, notify the light and power company.

The Ammeter

The ammeter is constructed as shown in Figure 4. Its moving parts are similar to the voltmeter. However, instead of having a high resistance in series with the coil, there is a heavy shunt across the coil.

In use the ammeter is connected in *series*

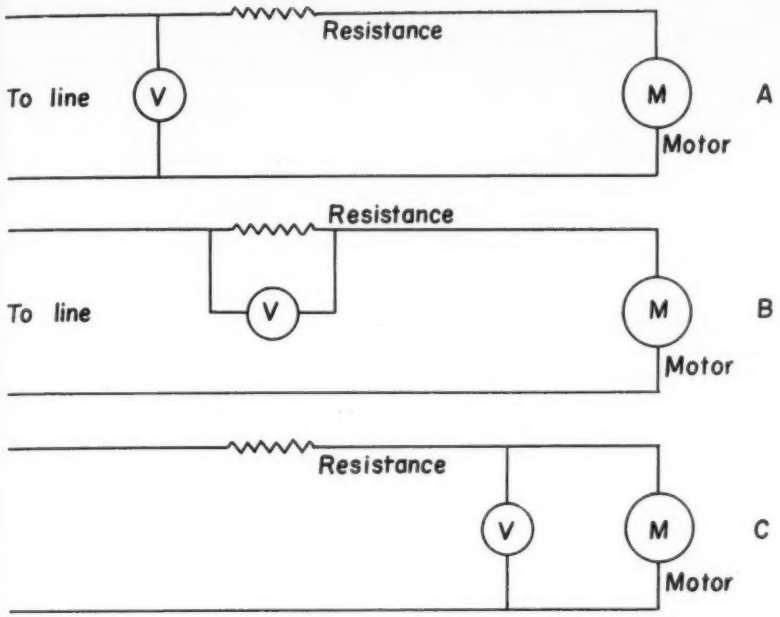


FIG. 3. VOLTMETER CONNECTIONS.
A. Measuring Line Voltage, Meter Connected at Fuse Panel.
B. Measuring Voltage Drop Across a Resistor.
C. Measuring Voltage Drop Across a Motor (B + C = A)

with the circuit, *never across* the circuit. If by accident, the ammeter is connected across the circuit, it will cause a short circuit and blow the circuit fuse. But before the fuse can blow, the ammeter will burn out.

The ammeter is used to check motors for overloads, to check feeder lines for overloads and to determine the correct size line fuses for an installation.

To check a motor for overload, the ammeter is connected in one of the motor lead wires and the reading taken when the machine is operating at average back pressure. That is, if the current reading is taken on an F12 air-conditioner which cuts-in at 35 lbs. and cuts-out at 12 lbs., the ampere reading would be taken when the back pressure was 23.5 lbs. This is found as follows:

Pressure range 35 pounds to 12 pounds

Average pressure $\frac{35 + 12}{2} = \frac{47 \text{ pounds}}{2} =$ 23.5 pounds

It is of prime importance on air-conditioners and on commercial refrigerators to know how the motor is loaded. Oftentimes a job is under-engineered. In order to produce results, a larger pulley is put on the motor in order to speed up the compressor. When this is done, the motor draws more current than it did normally. In order to insure long motor life, the current passing through the motor should be checked to see that it does not exceed the name plate current. If the current does exceed the name plate current, a larger size motor should be installed. Under no condition should a motor protector need to be more than 20 per cent higher than name plate current.

The Wattmeter and Watt-Hour Meter

The primary use of the wattmeter is in the repair of motors. However, a wattmeter can be used to estimate the cost of operation of a job or to convince a user that a refrigerator is or is not causing high bills. For a job of this kind, a watt-hour meter is best.

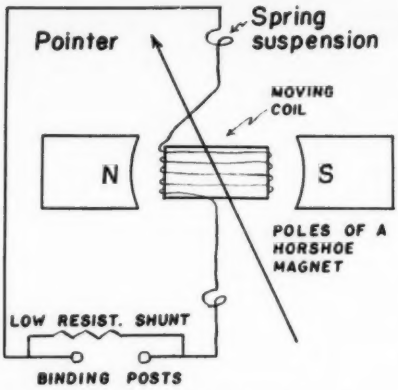


FIG. 4—D.C. AMMETER

The Ammeter Is Always Connected in Series with the Circuit, Never Across the Circuit. If by Accident the Meter Is Connected Across the Circuit, the Coil Will Burn Out Immediately.

A wattmeter is a combination voltmeter and ammeter. It is so made that it measures the product of voltage and current which we learned in last month's article, is power, e. i.

WATTS = (volts) (amperes)

(The above formula holds good in d.c. circuits only. In a later article it will be shown that in an a.c. circuit the power is always less than (volts) (amperes). For the sake of clarity, the writer leaves out this explanation at the present time.)

The wattmeter is made up of two separate coils, one of heavy wire, and one of high resistance, fine wire. See Figure 5 and 5A. Figure 5 shows the internal connections to the wattmeter and Figure 5A shows the correct method of connecting the wattmeter to obtain the power taken by a motor. Extreme care must be taken to insure the meter is connected correctly. If by chance the current coil is connected across the line instead of in series with it, the meter will immediately be ruined. In case the meter reads backwards, reverse the voltage coil leads, see Figure 5B. It is wise to leave one voltage lead off the meter until the power is turned on. Then by flicking this lead across the binding post, the correct voltage polarity can be obtained without injuring the meter.

Another protective measure is to install a short circuiting switch across the current coil of the wattmeter. Keep this switch closed except when taking a reading. This switch protects the current coil from the excessive current that flows through the motor at the instant the motor starts. It also will protect the meter in case the motor draws more power than the meter is capable of registering.

To use the wattmeter to check for high bills, take a reading at the average back pressure of the machine. Then time several cycles. If the cycles are erratic, check the machine for a bad liquid control device, a bad switch or loose switch bulb, a loose belt or varying service factor. However, if the cycles are more or less uniform, use the following procedure.

For the sake of illustration, suppose the machine ran six minutes and was off 12

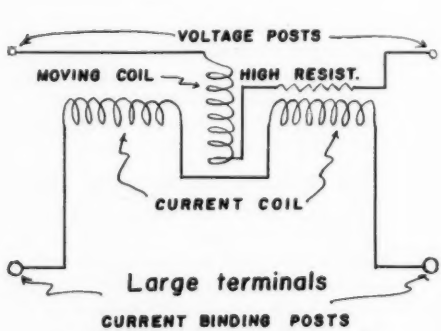


FIG. 5. WATT METER.

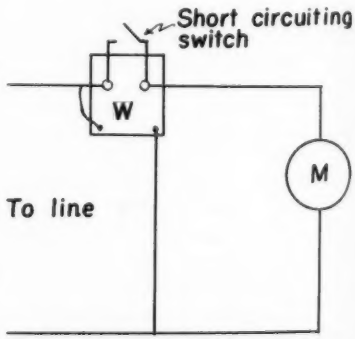


FIG. 5A. HOOKUP FOR OBTAINING POWER DRAWN BY MOTOR.

minutes, the wattmeter read 300 watts at 18 pounds back pressure on a F12 household job. Current costs 7 cents per k.w.

The total cycle is $6 + 12 = 18$ minutes

The per cent of running time is $\frac{6}{18} \times 100 = 33$ per cent.

In 24 hours the machine would run 24 hrs. $\times .33 = 7.92$ hours or say 8 hours

The power consumed would be

300 watts $\times$ 8 hrs. $=$ 2400 watt hrs.

The power per month would be

$2400 \times 30 = 72{,}000$ watt hrs.

$= 72$ Kilowatt hrs.

The current cost is

$72 \times .07 = \$5.04$

CORRECTIONS TO DECEMBER ARTICLE

EDITOR: Had a little spare time the other day so I got to studying the article, "Electronics for Service Men." Have always been interested in work of this kind so am very much pleased to see you including this information in your magazine.

I think the article is very good, but there are a few errors in print that I would like to point out:

On Page 12 in the first column, the last equation in large type, shows $P = A^2R = (10)\ (10)\ (10) = 100$ watts. Should read 1000 watts.

Just below this equation, or the first equation in small type, shows $P = \frac{(100)\ (100)}{10} = \frac{1000}{10} = 1000$ watts. The 1000 over the 10 should be 10,000.

In small type at the top of Page 12, second column, is the statement, "A watt is the unit of electrical pressure." I believe this is wrong. I have always understood that the watt is the unit of electrical power, and the volt is the unit of electrical pressure. However, you say the same thing down the column a little farther.

Your last equation on Page 12 has me licked. I cannot see how a motor running on a 110-volt line, drawing 5 amps. could possibly lose 1815 watts, even if the full power was reaching motor and none was lost in the switch. If $P = VA$, it would take only 550 watts to run this motor, not counting what was lost in the switch.

In the last equation, where do you get "5" as the resistance? According to the formula "R = V over A," 22 ohms would be the resistance of the motor. So, I should think to get the power lost in the motor the formula should be 95 squared over 22 = 410 watts lost in motor.—*C.A.F.*

ANSWER: The errors as pointed out by the reader are quite evident. They are typographical errors with the exception of the last equation on Page 12. This equation was written for another diagram which was omitted in the final manuscript. Hence, the equation does not apply to Figure 5.

To enumerate the errors on Page 12:

1st column, line 9 should read:

$P = A\,R = (10)\ (10)\ (10) = 1000$ watts

1st column, line 14 should read:

$$P = \frac{(100)\ (100)}{10} = \frac{10{,}000}{10} = 1000 \text{ watts}$$

2nd column, line 1, should read:

A watt is the unit of electrical power. This correct definition appears in line 7, column 2.

The reader is in error in the power consumed by the motor in Fig. 5. To find the power consumed by the motor:

$$R_{motor} = \frac{V_{motor}}{A} = \frac{95}{5} = 19 \text{ ohms}$$

$$P_{motor} = \frac{V^2_{motor}}{R_{motor}} = \frac{(95)\ (95)}{19} = 475 \text{ watts}$$

The total power lost in the circuit would be:

$P_{total} = (V_{line})\ (I_{line}) = 110\ (5) =$ 550 watts

To check this:

$$P_{total} = \frac{V^2_{line}}{R_{total}} = \frac{(110)\ (110)}{(3 + 19)} = 550 \text{ watts}$$

$P_{total} = P_{switch} + P_{motor} = 75 + 475 =$ 550 watts

For the sake of the advanced reader, it must be pointed out that these equations for power absorbed by a motor and for the resistance of a motor hold true only for d.c. circuits. In a later article, power factor will be added to the above equations to make them hold for either a.c. or d.c. Power factor has not been discussed as yet to avoid confusion.—*W.G.C.*

Servicing the Majestic Electro-Sealed Unit

Description and Illustrations of the Model 100 and 200 Series. Component Parts. First Article.

MODEL NO. 100 was the original Majestic hermetically sealed unit. Model Nos. 101, 102, 103, 205, 207 and 209 were of subsequent manufacture and included refinements made in the manufacture of these later units. Sulphur dioxide is the refrigerant used.

In Fig. 1 is illustrated the four vane rotary type compressor. The center of the rotor is offset from the center of the bore of the compressor body. As the rotor revolves, the vanes move in their respective slots in the rotor (see Fig. 2). The four chambers formed between the body and rotor assembly change in volume as the rotor revolves. By this action, with suitable arrangement of intake and exhaust ports, the vaporized gas is drawn into each successive chamber. It is then compressed and discharged into the compressor dome. Due to the volume of the dome, the velocity of the compressed vapor is reduced to such an extent that the oil particles suspended in the vapor settle to the base of the compressor housing.

From the compressor dome, a tube delivers the compressed vapor to the condenser, where it is converted to a liquid which passes into the float valve chamber.

Lubrication

The Majestic refrigerator unit has a complete and positive oil circulating system or cycle which supplies all bearing surfaces with oil under pressure. This oil system, in addition to lubricating the bearings, also floods the motor windings, thereby carrying off the motor heat which is dissipated by the oil cooler. This oil cooler is assembled in the housing with the SO_2 condenser, and is also cooled by the air stream created by the fan (see Fig. 3).

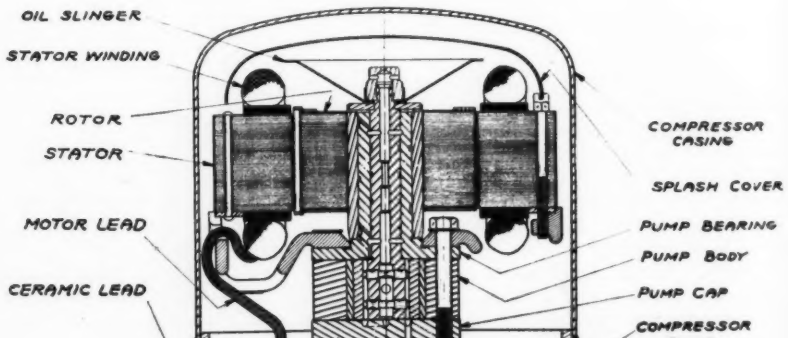


FIG. 1. VERTICAL SECTION OF MAJESTIC ROTARY COMPRESSOR.

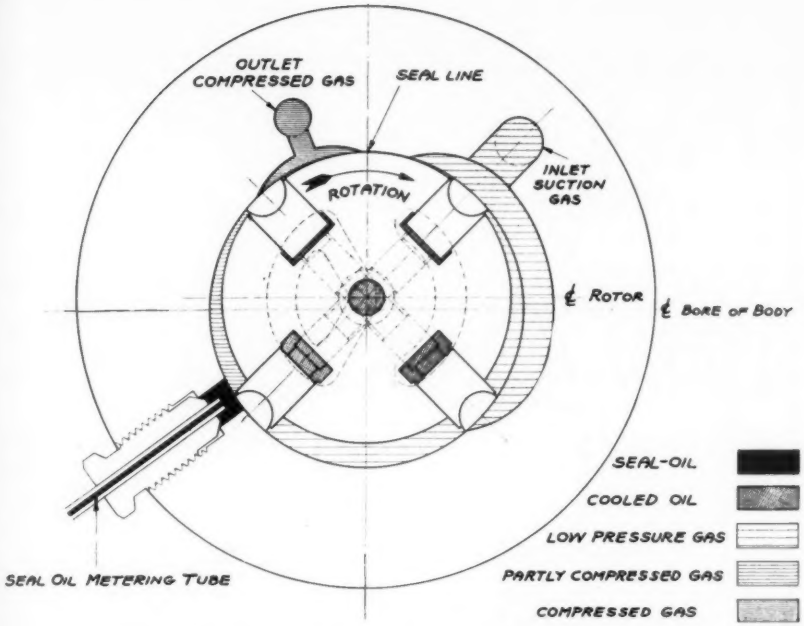


FIG. 2. HORIZONTAL SECTION THROUGH MAJESTIC PUMP.

Condenser

The condenser is made of finned, copper tubing. The fins are placed on the tube to give it the maximum heat radiating surface. The condenser is designed as to size and area so that the maximum efficiency of heat removal is accomplished in conjunction with the fan and air circulation provided. One section of the tubing in the condenser housing is used as an oil cooling coil (see Fig. 3).

Float Valve

The float valve is of the needle valve type and is placed between the condenser and the evaporator, commonly known as a high side float. Its function is to meter the liquid sulphur dioxide into the evaporator as required to maintain the proper distribution of refrigerant throughout the system. It also maintains the proper pressure differential between the high and low pressure sides of the system. The float valve consists of the following parts: A float ball, which is made of copper plated steel; the body, which is made of drop forged brass; the float chamber, which is made of drawn brass; the seat, which is made of special bronze; and the needle, which is made of stainless steel. The float ball is constructed of steel so that in the event any particles of foreign matter obstruct the needle on the seat, the valve will not have to be removed in order to clear it. The clearing of the valve may be simply accomplished by the external use of a magnet to raise the float ball in the chamber (see Fig. 4).

Evaporator

The evaporator or cooling coil is located in the food chamber of the refrigerator. It is constructed with a horizontal header to which is connected a series of looped copper tubes formed around the ice tray sleeves. Inside the header is a buoyant oil return cup guided by the suction line fitting. This cup floats on the surface of the SO_2 and skims the oil which collects on top of the SO_2, returning it to the compressor with the

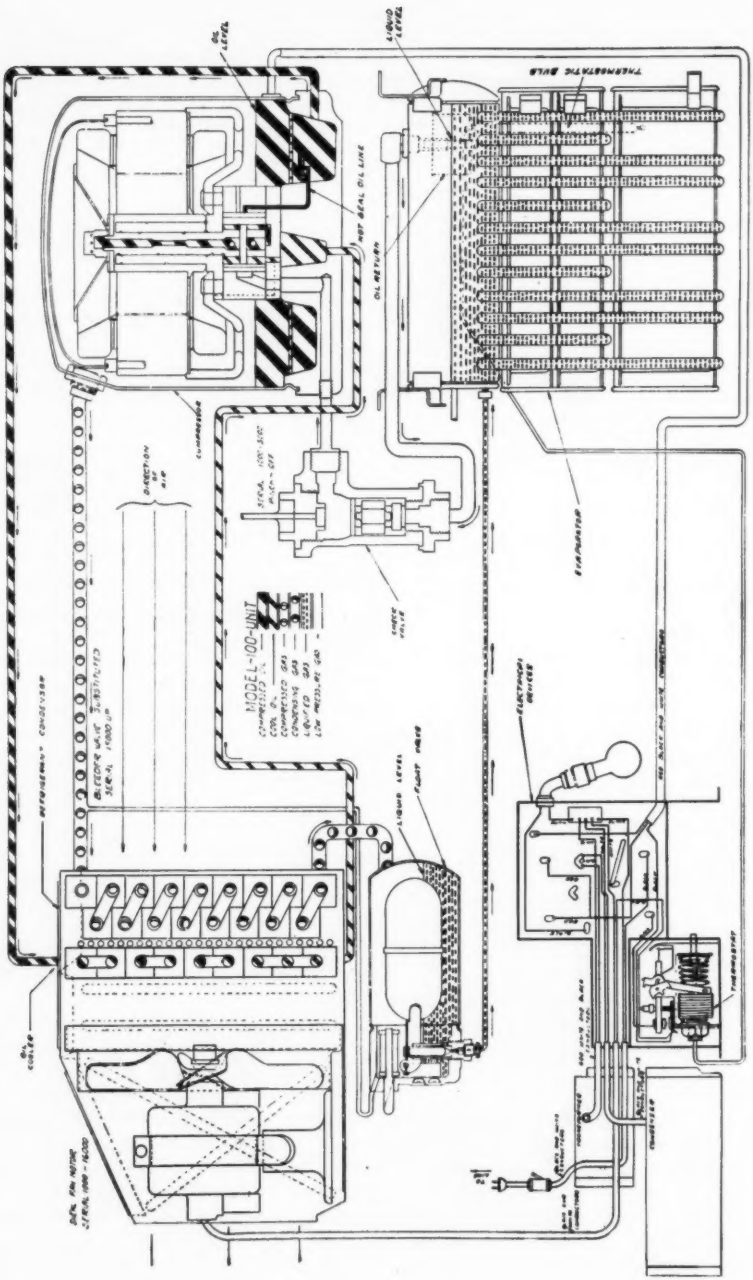


FIG. 3. GAS AND OIL CYCLE CHART, MODEL 100.

FIG. 4. METHOD OF BLOCKING FAN AND APPLYING OF MAGNET. COVER REMOVED FOR CLEANING SO_2 CONDENSER.

suction gas. This oil cup prevents the formation of an excessive oil blanket which would retard vaporization of the sulphur dioxide (see Fig. 3).

Check Valve

The check valve, which is located between the evaporator and the compressor, prevents the backward flow of hot gas and oil from the compressor to the evaporator during the idle period. It consists of a forged brass body, brass plunger and stainless steel seat (see Fig. 5).

Compressor Motor

The Majestic motor is a squirrel cage, induction motor of the capacitor type. It consists of two parts, the stator and the rotor. The stator has two windings which are known as the starting winding and the running winding. The stator is made up of specially annealed steel laminations which

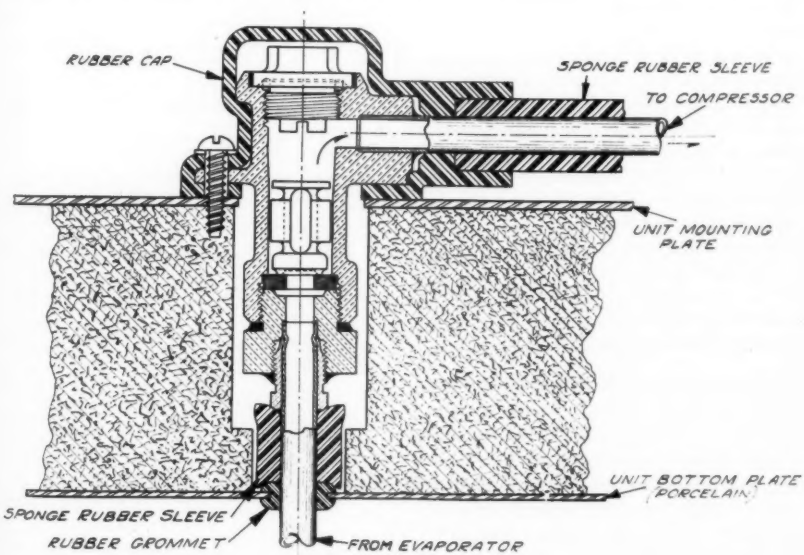


FIG. 5. CHECK VALVE.

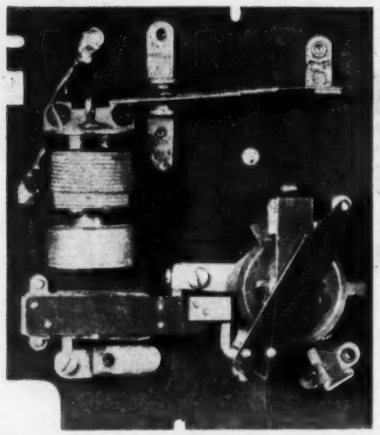


FIG. 6. OVERLOAD TRIP ASSEMBLY FOR MODEL 100 UNIT.

are punched to size, riveted together and ground to dimensions. The stator is wound to form four poles. Each pole winding is made in three sections. The running and the starting winding are wound with double cotton covered wire.

The motor rotor is built up of laminations of steel of the same specifications as the stator.

The center of the rotor is fitted with a sleeve, the bottom and inside of which form a bearing surface with the compressor bearing plate. The inside of the sleeve and the outside of the compressor bearing plate are grooved spirally to allow continuous forced feed lubrication.

The motor rotor is connected to the compressor rotor at the top of the motor rotor sleeve, by a floating universal connector. This driving arrangement distributes the bearing loads of the motor and compressor to their respective bearings (see Fig. 1).

Transformer and Electrical Condenser

The electrical condenser and the transformer are used to provide the necessary phase displacement effect in the starting windings of the motor to give, in effect, the high starting torque and high efficiency of a two-phase motor on a single-phase power supply. When the motor starts, the transformer increases the voltage of the condenser, thus increasing its phase displacement effect. When the motor reaches the desired speed, the relay opens the transformer circuit, but allows the condenser to remain in the circuit, thus retaining the phase displacement characteristics during normal running. The phase shifting transformer and the electrical condenser are separate units mounted on the unit base. The electrical condenser has a capacity of eight microfarads, and is impregnated against moisture for long life.

Relay

The relay, as shown on Fig. 6, is made of the following parts: solenoid coil and plunger, contact arm and contacts.

Upon starting, the current through the solenoid winding is sufficient to lift the ar-

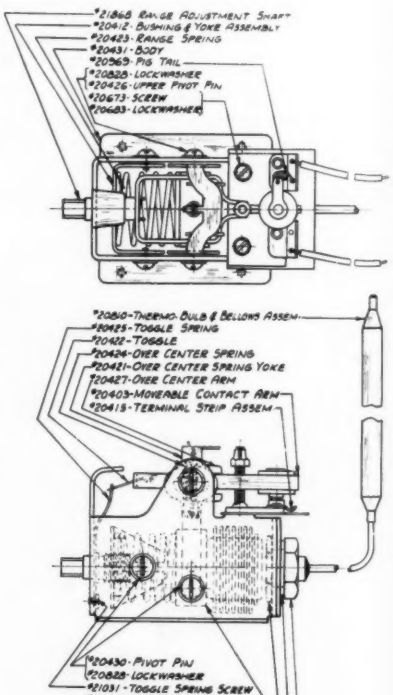


FIG. 7. TYPE S. M. THERMOSTAT, MODELS 100-101-102-103.

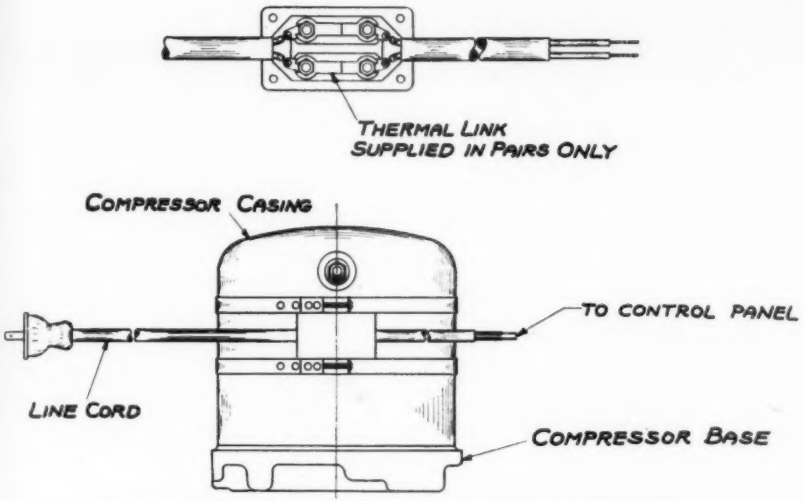


FIG. 8. ARRANGEMENT OF THERMAL CUT-OUT ON COMPRESSOR.

mature plunger, closing the upper contact and thus connecting the phase shifting transformer into the motor circuit.

When the motor reaches normal speed, the current decreases, releasing the plunger, which opens the upper contact and closes the lower contact.

Thermostatic Control, Type S. M.

The thermostatic control is the device which is used to regulate the temperature of the food compartment of the refrigerator. If a quantity of sulphur dioxide is charged into a sealed tube and bellows assembly, there will be a certain definite movement of the bellows for every change in pressure, due to change in temperature.

In the thermostat, a cross arm is placed between the bellows head and the range spring, utilizing the motion due to pressure changes to operate a special type of over center switch. It can readily be seen that if the spring pressure is increased against the bellows, a higher pressure and consequently a higher temperature of the tube will be necessary to throw the switch. Conversely, if the spring pressure is decreased, the bellows pressure necessary to throw the switch will be decreased (see Fig. 7).

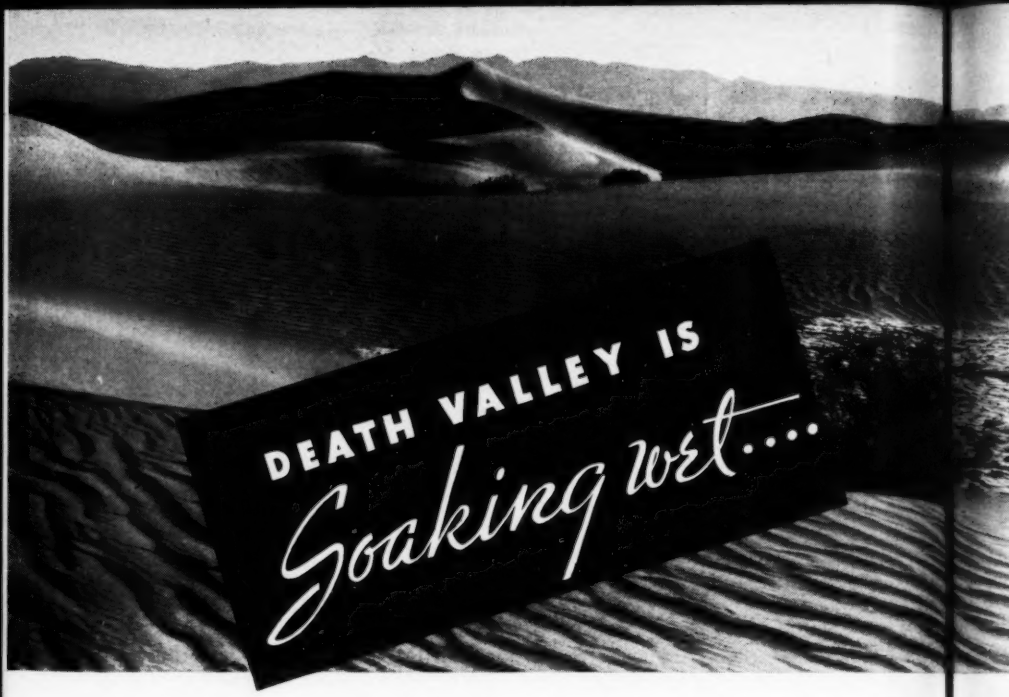
The temperature control knob is merely an external means of decreasing or increasing the spring pressure, thereby regulating the box temperature.

Overload Trip

The overload trip is a device designed to protect the motor windings against electrical overloads. Should there be any electrical disturbances or overloads, the trip will promptly break the circuit, thereby stopping the motor to prevent damage to the unit.

After a short interval, the circuit is automatically closed. If the overload condition still exists, the trip again promptly breaks the circuit. The opening and closing of the circuit is repeated automatically three times. After the third attempt to start, the overload trip will lock itself in the off position, and light the green pilot light on the escutcheon plate, which is a signal that a service man should determine and correct the cause of the overload.

The overload trip in its operation is not complicated. In case of an overload, the line current will be increased. A small heater grid is placed in series with the line and any increase of current above normal will cause sufficient heat to be generated by the grid to cause the bi-metal strip placed directly over the grid to bend and trip the



Compared to FEDDE A

COILS, VALVES, UNIT COOLER EV

Absolute dehydration of the interior of refrigeration equipment is recognized today by engineers throughout the industry as one of the most important safeguards of the performance and life of the entire system. It is obviously as important for the Lowside to be absolutely dehydrated as it is for the Highside.

It is an absolute Fedders rule that dehydration cannot be slighted for the sake of saving a few hours at the sacrifice of performance.

Fedders dehydrating ovens are electrically heated, and maintained at accurately controlled temperatures by automatic thermostats.

In addition, vacuum lines are connected to each product being dehydrated. A vacuum of 28 inches is maintained, thus reducing the boiling point and assuring immediate vaporization and removal of every trace of moisture from the interior.

Coils, valves, and other products are kept

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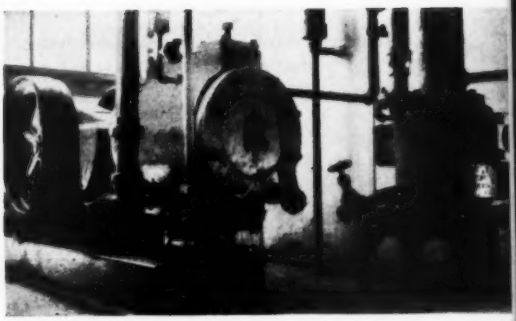

Heavy duty vacuum pump used in dehydrating Fedders Refrigeration Products to assure absolute removal of every trace of moisture.

ODS ABSOLUTELY DEHYDRATED
ER EVAPORATORS, CONDENSERS

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One of several batteries of Fedders Dehydrating Ovens. Note Vacuum recording dial in foreground.

ERS
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talo, N. Y.

escapement. The escapement is a spring wound device which operates whenever the bi-metal strip is flexed in either direction sufficiently to release the catch (see Fig. 6).

After the overload trip has operated three times and definitely cut off the machine, and illuminated the pilot lamp, it may be reset by means of the reset knob placed on the side of the control housing. Instructions covering the use of the reset knob are printed on the housing.

Thermal Cut-Out

The thermal cut-out is an auxiliary device for the protection of the unit against excessive temperature or pressure conditions.

It consists of two metal links connected in the line cord before it enters the control box. Each link consists of two parts connected with a low melting point alloy and mounted in a ceramic block clamped to the compressor dome. When the temperature of the dome reaches approximately 200° Fahrenheit, the fusible alloy melts and the links spring apart, opening the circuit (see Fig. 8).

Caution: In the event a thermal link has opened, both links must be replaced by new links. Under no circumstances should these links be resoldered or replaced with a jumper of any sort. When replacing the thermal cut-out assembly, care must be taken to insure firm contact to the dome.

Fan Motor

Lubrication is provided by means of a wick and wool yarn, which carry oil from a reservoir in the housing. Except in extreme cases, oiling should not be necessary more often than once every six months. Care should be taken when filling the reservoir to prevent overflow, as exeessive oil may damage the rubber mountings.

Model Nos. 101 and 103 Units

These two units are similar in general construction to Model No. 100, with the exception of the size of the evaporator. Model No. 101 is equipped with a two-tray evaporator, and Model 103 with two shallow and one deep tray.

The compressor lubrication system, condenser, float valve, evaporator and check valve are the same as employed in Model No. 100 unit.

Electrical Equipment

The compressor motor on the Nos. 101 and 103 are the capacitor type induction motor, using a transformer and condenser with a solenoid relay for shifting motor connections from starting to running winding. The compressor motor and electrical condenser and transformer on Model Nos. 101 and 103 are not interchangeable with the corresponding parts on Model No. 100.

Model No. 102 Unit

This unit is fundamentally the same as the Model No. 100 unit, except that a resistance start induction motor as shown on the electrical circuit (Fig. 9) is used. The compressor is equipped with an unloader or by-pass valve to facilitate starting.

The unloader valver is assembled into the compressor, and is connected between the suction and discharge of the compressor, providing a by-pass when open. On starting, the compressor pumps against no head pressure, enabling the motor to start with practically no load, and quickly reaches normal operating speed.

Then the compressor discharge operates a plunger in the unloader valve closing the by-pass operation.

Model Nos. 205, 207 and 209 Units

These units, simplified in appearance, are comparable in basic design with the Majestic hermetically-sealed units described.

Model No. 205 unit is equipped with a two-tray evaporator furnishing 42 ice cubes. The evaporator front has no door, and no side baffle is installed on the evaporator.

Model No. 207 unit is equipped with a four-tray evaporator furnishing 84 ice cubes. An evaporator door and an enameled baffle plate are provided.

Model No. 208 unit is equipped with a five-tray evaporator furnishing 105 ice cubes. An evaporator door and enameled baffle plate are provided.

The construction and arrangement of various parts on the unit mounting plate are identical on all three models.

The compressor on these models is

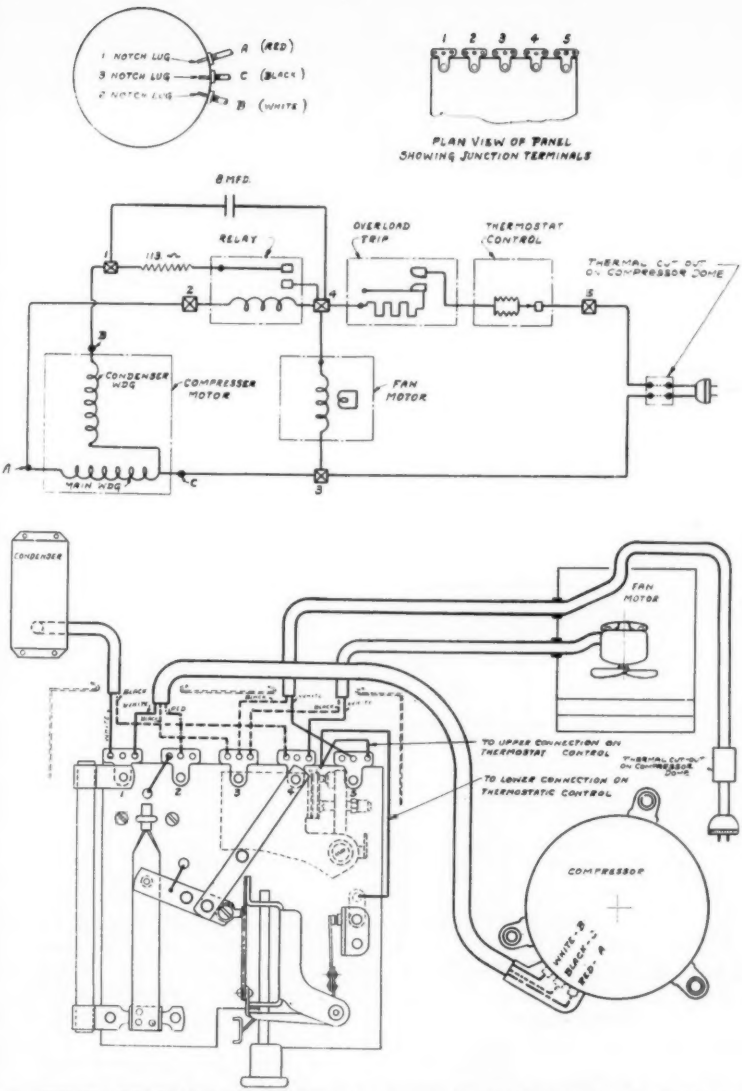

FIG. 9. WIRING DIAGRAMS FOR MODEL 102. RESISTOR CAPACITOR TYPE, 50-60 CYCLES, 115 VOLTS.

mounted on a combination spring and rubber suspension.

Compressor

The rotary compressor is fundamentally similar in construction to all previous models with increased capacity.

The dome of the compressor is electrically welded to the base.

A combination oil charging, purging and gauge connection valve has been placed on the dome at the point of gas discharge. See Fig. 10 for design of this fitting and valve.

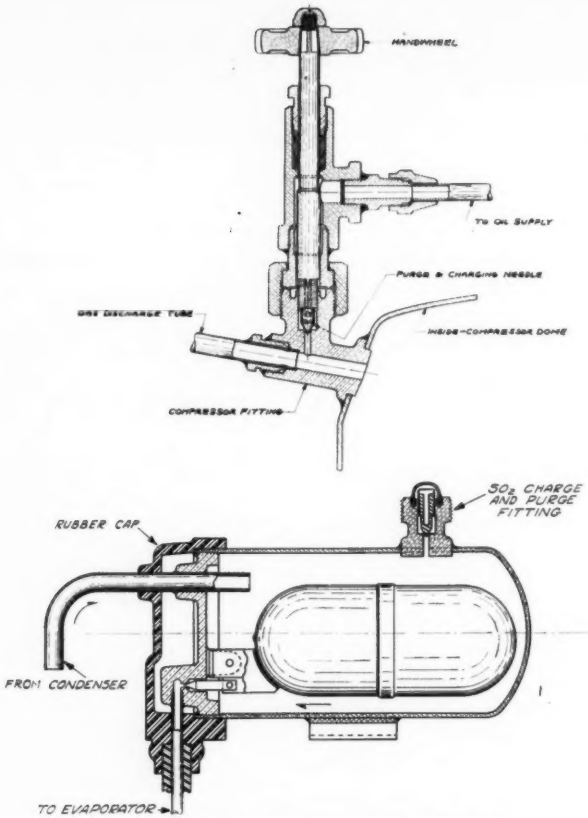

FIG. 9. ABOVE: PURGE AND CHARGE E VALVE.
BELOW: FLOAT VALVE MODEL NOS. 205-207-209.

These valves are so designed as to facilitate the use of service gauges and are sealed with a cap to retain the hermetically-sealed feature.

Lubrication

Refer to gas and oil cycle chart, Fig. 11.

SO_2 Condenser

For description of the condenser and oil cooler, refer to previous description of Model 100. The condenser housing has been provided with a removable cover to facilitate cleaning the condenser.

Float Valve

The float valve is placed in the path of the cool incoming air, which pre-cools the refrigerant before it is delivered to the evaporator. The float valve housing has an SO_2 charging and purging valve fitting. See Fig. 10. Rubber shielding is placed over the header of the float valve as well as the liquid line to prevent condensation of moisture. An electro-magnet can be used to operate the steel float ball.

Evaporator and Check Valve

These are the same as described for previous models.

The check valve is of the same construction as described for the Model No. 100 unit. The body and suction tube are cov-

TO RELAY AND HIGH PRESSURE CUT-OUT

FIG. 11. GAS AND OIL CYCLE CHART UNIT, MODELS 205-207-209.

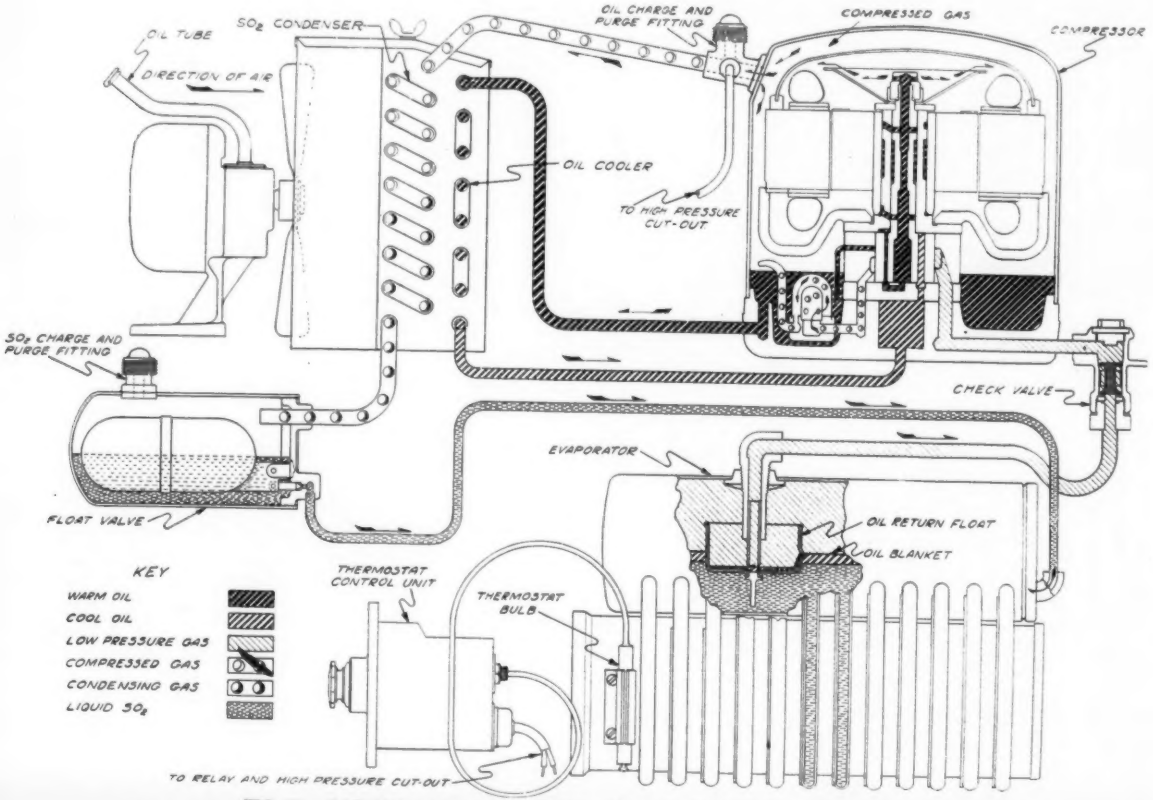

FIG. 11. GAS AND OIL CYCLE CHART UNIT, MODELS 203-207-209.

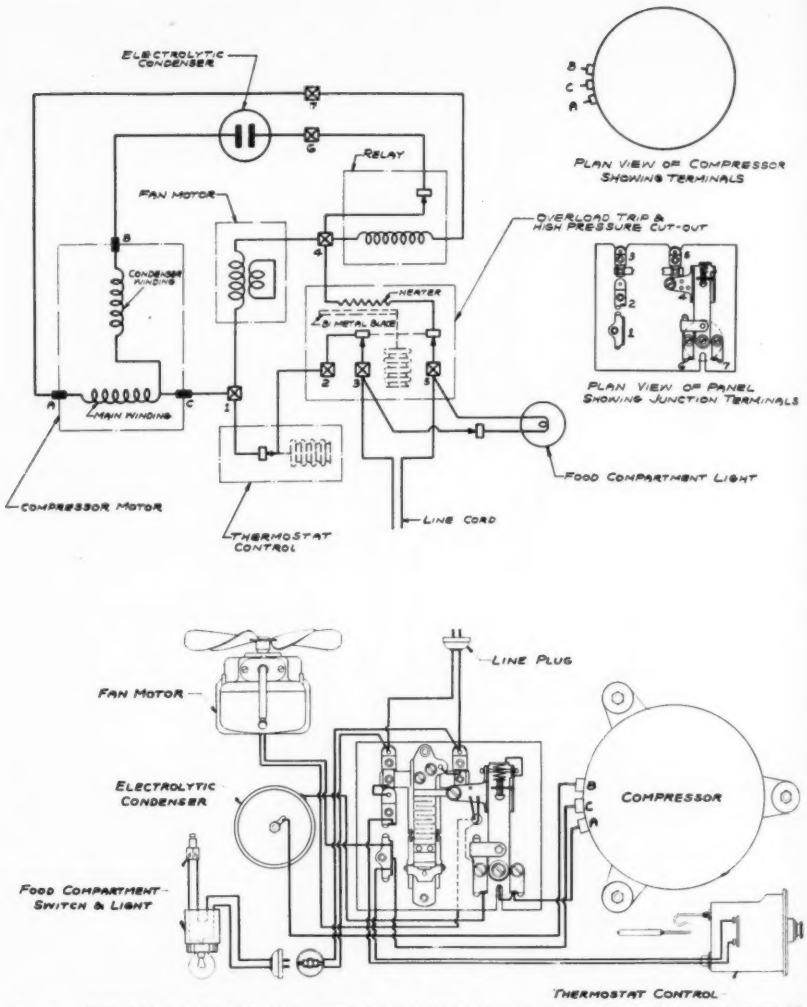

FIG. 12. WIRING DIAGRAMS FOR MODELS 205-207-209, CONDENSER TYPE, 50-60 CYCLES, 115 VOLTS.

ered with rubber shields to prevent condensation of moisture.

Electrical Equipment

The motor is of the electrolytic start, induction run type, employing a 100 mfd. starting condenser.

Electrolytic Condenser

The electrolytic condenser is connected into the starting winding of the motor only on the start to provide high starting torque, see Fig. 12.

Relay

A relay actuated by a solenoid coil in series with the running windings, closes the starting circuit until the motor has attained proper speed. It then opens the starting winding circuit (see Fig. 13).

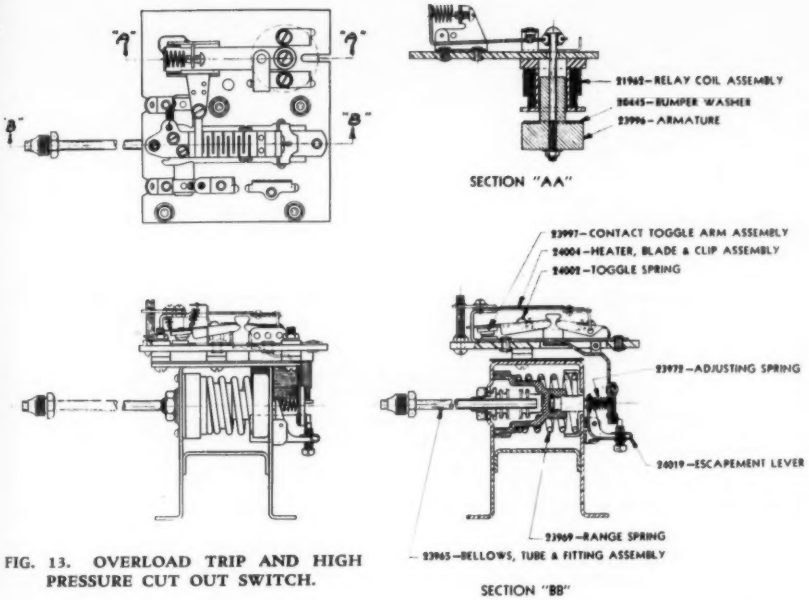

FIG. 13. OVERLOAD TRIP AND HIGH PRESSURE CUT OUT SWITCH.

Auto-Reset Protector

This device consists of a combination electrical overload trip and high pressure cut-out switch. The mechanism is assembled as a part of the control panel. The electrical overload trip consists of a bi-metal strip anchored at one end and heated, in event of an overload, by a resistance grid connected in series with common lead to the motor. In the event of an electrical overload, the free end of the bi-metal strip raises sufficiently to actuate an over-center switch which opens both sides of the line, thereby stopping the motor.

When the motor has been idle for a sufficient length of time, the bi-metal strip will cool and return to its normal position, closing the auto-reset switch. Should the overload condition still exist, the electrical overload will continue to cut "off" and "on" until the condition in the line has corrected itself, or the pressure in the compressor has been increased sufficiently to cause the high pressure cut-out to function.

The high pressure cut-out which operates in conjunction with the electrical overload and over-center switch, consists of a bellows actuated by the pressure in the system to move a plunger against a calibrated spring.

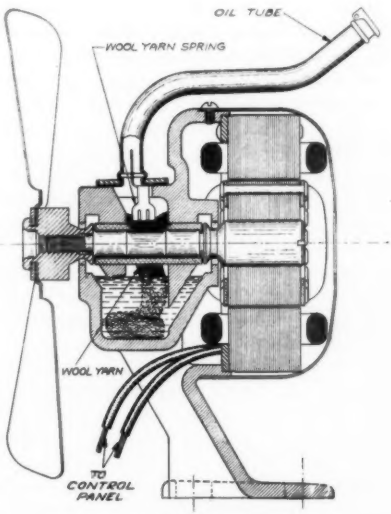

FIG. 14. FAN FOR UNIT MODELS 205-207-209.

When the pressure reaches a pre-determined value, a latch disengages the pivoted toggle arm. A spring behind the toggle-arm then causes the pivots of the over-center switch to be lowered sufficiently to open the auto reset switch contacts (see Fig. 18).

Should the high pressure cut-out function, it is necessary that a service man determine the cause of the high pressure condition before removing the control box cover to manually reset the switch.

Fan Motor

The fan motor mounting has been designed to provide positive oiling.

The fan is of the pusher type (see Fig. 14).

Cool air passes across the fan before passing through the warm condenser, thus cooling the fan motor and adding to its life.

Service Procedures and Service Methods will be outlined in the following article in the February issue.

? ?

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box." The following questions are answered by Mr. George H. Clark.

? ?

WILLIAMS ICE-O-MATIC

QUESTION 172. *Having trouble with a Williams Ice-O-Matic, Model A, which is only three years and six months old.*

This machine has a card tag stating that 2 pounds of methyl chloride is the charge of gas for same. After clearing all gas and pulling a vacuum of 15 inches, I put 2 pounds of methyl gas in machine and could get only 60 pounds of head pressure on same, with 12 to 20 pounds of back pressure, with no frost in evaporator. All lines are clear.

I would like to know what head pressure I should have at a 72 degree room temperature. If you think this compressor is worn, will new rings on piston help to remedy the trouble, if machine has rings?

ANSWER: With a 72 degree room temperature, you should have approximately 75 pounds to 85 pounds head pressure on this Williams machine when everything is working normally. On the machine which you describe, it is quite evident that the compressor, for some reason or other, is not pumping any appreciable amount of refrigerant, as the head pressure which you get corresponds to the room temperature, indicating that no heat is being passed from the refrigerant to the room air.

Unless something very unusual has happened, I doubt very much if the pistons or cylinders would be worn enough to cause the trouble which you apparently have. I believe you should check your compressor valves and also the valve in the evaporator to be sure that they are in proper working order. I am sure that you will find your trouble either in your compressor valves or possibly in your float valve. If the trouble is in your float valve, you will hear the refrigerant blowing through quite freely. If you do not hear this, check your compressor valve first.

KEEPING OIL IN COMPRESSOR

QUESTION 173. *Will you please give me some general information about "keeping oil in the compressor" with regard to starting up units, shutting them down overnight, and leaky discharge valves?*

ANSWER: With respect to keeping oil in the compressor when starting up units and shutting them down and especially where there are leaky discharge valves, I would say simply that we should decrease the crank case pressure as slowly as possible after starting up the machine. Where refrigerant has leaked through into the crank case and there may be liquid refrigerant in the oil,

which may be the case if the machine has been shut down over night, it is almost impossible to keep the compressor from slugging when it is first started. I would suggest that you might possibly find the use of an oil trap of some value in returning the oil to the compressor and thereby keeping the compressor from becoming dry of oil.

MOTOR TESTS

QUESTION 174. *I have had quite a few motor jobs on refrigerators and oil burners, and generally send these motors out to be repaired, and at times, I believe I am being charged for a rewinding of the starting winding and also for a new condenser when the motor may only need a new condenser, or just the rewinding of the starting winding on the capacitor motor.*

What I would like to know is how to test a capacitor motor for:

1. *A bad condenser.*
2. *For an open or shorted starting winding.*
3. *For an open or shorted stator winding.*

Testing of Split-Phase Motors for (oil burner):

1. *Opens in starting windings.*
2. *Opens or shorted stator winding.*
3. *Bad switching devices.*

Any information on the enclosed questions would be greatly appreciated.

ANSWER: In connection with testing the motors for the various troubles that you specify, I believe that as good an indication as any for a bad condenser is simply to use an auxiliary condenser with the motor in question and see if it operates with a good condenser. If it operates with a good condenser and does not operate with the one which comes with the motor, it is an indication that the condenser is bad. If the motor operates the same in either case, in all probability the condenser is good.

To test for an open starting winding, it would be necessary to isolate the starting winding from the running winding and connect to a line through an electric light. If the light in series with the starting winding shows no current, the starting winding is open. A light of low wattage should be used for this test.

To test for a shorted starting winding, test the starting winding with an ammeter and see that the current drawn by the winding is not excessive.

The same test applies to the open or shorted stator winding, and also to the windings of the split phase motors used for other purposes.

The switching devices such as controls and starting switches in the motor may be tested for drop in voltage through the switching devices.

For a well equipped electrical laboratory other tests might be made.

CHARGING GRUNOW

QUESTION 175. *I would like some information on the Grunow household refrigerator, Model 60, as to how to recharge refrigerant and oil. I have a job on one that has trouble in getting started. The electrical part seems to be okay. The thermostat throws on, but the motor just hums for some time before it starts. The machine runs for one hour before cutting out, but has an off period of the same time.*

Do you think this trouble would be caused by lack of refrigerant?

ANSWER: The best way to recharge the Grunow machine, is my estimation, is to use the special service valve which may be procured for this machine. This service valve connects to the top of the receiver and when installed can be opened to a tube to the suction side of an auxiliary compressor and the system evacuated by means of this auxiliary compressor. Then if the machine is at a low temperature, the oil and refrigerant may be drawn into the receiver by a tube in much the same manner that oil is ordinarily drawn into any refrigerating system with the compressor stopped. The fact that the motor hums for some time before it starts is an indication that either there is something wrong in the starting mechanism of the motor or that the compressor sticks, which would indicate that the compressor should be taken apart and thoroughly cleaned.

MOISTURE TROUBLE

QUESTION 176. *I am having some trouble with Model L4, Copeland, serial number 163586. The system is charged with five and a half ounces of CH_3Cl.*

Regardless of how wide the expansion valve is open, the job continues to pump down to twenty or thirty inches volume. I have put two activated alumina dryers on the system and completely recharged it. I have changed the oil and replaced the discharge valve in the compressor; also, replaced expansion valve.

I should like to know if this condition is due to moisture in the system. If so, how can it be removed? As you probably know, this system is a semi-hermetically sealed unit, the refrigerant coming in contact with the coils of the motor. If there is moisture in these coils, how can it be removed without ruining the coils?

ANSWER: The Copeland machine which you describe must have either a screen or line plugged some place or else must contain enough moisture to freeze up at the expansion valve. In this connection I might mention that activated alumina is a very slow drying agent and will not prevent mechanical freeze ups shortly after being installed in the system unless there is a very small amount of moisture present. My suggestion would be that you use a dryer freshly charged with calcium chloride and of sufficient size so that you know that the calcium chloride will hold all the moisture the system could contain. Leave this dryer in the system from one day to a week and then remove or replace it with a small activated alumina dryer.

Incidentally, if the system still has the very small receiver which was originally used with this machine, I would advise that you install a small auxiliary receiver while you are servicing the job so as to be able to use a charge of three-fourths to one pound of methyl chloride at least.

If the coils in the motor contain moisture, this might be removed by closing the discharge service valve against the condenser connection and pumping out into the atmosphere. The suction service connection would be closed against the suction line so that the compressor would be drawing a vacuum from the case containing the motor and the machine could be left running with the valve in position indicated for a period of 24 hours. A continuous running of the motor would of course heat up the coils in the motor and at the high vacuum you should obtain, the moisture would be evaporated out of the windings.

FRIGIDAIRE

QUESTION 177. *I overhauled a Frigidaire compressor Model A 375, all parts new but pistons and rings; also, ran compressor in for at least four hours.*

Started this equipment the day before I left for the R.S.E.S. Convention, and before my return, this customer informs me that he was obliged to call in another serviceman, as the case got so hot that one could not hold one's hand on same. To remedy this trouble, he informs me that the serviceman put in three pints of oil. As I had already put in two quarts of oil, I would ask you to inform me where all this oil went to.

Another thing I would ask you is why the Frigidaire recommends a ¾-hp. motor on two small coils in a fountain hook-up, since in a fountain after the sweet water coil gets the necessary amount of ice on it, it only has to work on one coil. Is there a possibility that the compressor is too large and pumps the oil out of the case?

Your information on the above will be greatly appreciated.

ANSWER: It is quite possible that the two quarts of oil which you put into the compressor was largely carried over into the evaporator and if the evaporator was short on oil, the oil would not return from the evaporator as fast as it had left the compressor. Oil is especially apt to leave the compressor when the capacity of the machine may have been increased due to over-hauling. In that case, when the machine first started up after a shut-down period, the oil in the crank case might have been saturated with gas; and on a quick pull down due to high compressor capacity, the oil in the crank case tended to foam and carry out of the crank case especially fast.

With respect to the motor recommendations on the fountain hook-up, I am not entirely familiar with Frigidaire recommendations but I would say it is good engineering on their part to recommend the large motor on this type of work as with the sweet water bath full of warm water, the machine will be pretty heavily loaded until the water tem-

perature comes down to the operating range. The other coil in connection with a fountain hook-up may also have a high load for some period of time which will require additional horsepower until the load is eased off as the temperature comes down. Probably in normal operation the ¾ h.p. motor will not be required but this motor may be fully loaded during the pull down period and having a motor of sufficient size is insurance against motor burn-outs during this period.

OVERLOADED MACHINE

QUESTION 178. *As a subscriber to your* REFRIGERATION SERVICE ENGINEER *magazine for the past nine months, I would like to have you diagnose the following trouble which I was called to service recently, and which I believe is overloaded. The complaint is high electric bills, and machine runs almost continuously in hot weather. The equipment consists of: one Model 2 C Frigidaire compressor, ⅓-hp. air-cooled; one 5 foot by 6 foot by 8 foot high walk-in cooler, insulated with 4 inches of corkboard, and newly constructed; cooled by a Peerless flash cooler with Fedders expansion valve.*

Customer also has meat chopper inside of box, and one Warren 8 foot double-duty showcase with two coils and one expansion valve.

If the above is overloaded, please figure same for me and mail recommendations as to size of compressor needed, B.t.u. to be extracted, etc. for above, for which I am sending a self-addressed envelope. Also, would it be advisable to install two-temperature valves on showcase, as customer would like to have a higher temperature in show case, around 45°. The above job is a SO_2 job.

ANSWER: I would say that the ⅓ h.p. motor is altogether too small for the load which you say it has connected to it. I would recommend that a ½ h.p. water cooled machine be used for the cooler line and an additional ¼ h.p. for the show case; in other words, I would recommend that not less than a ¾ h.p. water cooled machine be used for these two coolers.

With the air cooled machine, in warm weather the capacity of the machine is decreased considerably by high condensing pressures and the heat load is increased due to high temperatures around the coolers with the result that the machine would undoubtedly have to operate continuously and even then it would seem to me that it would have difficulty in handling the job. Furthermore, with the machine running continuously, there is the possibility of building up frost on the evaporator if the coil temperature is maintained below 32°.

If you want to maintain a higher temperature in the show case than you now have, it would probably be advisable to install a two-temperature valve in the suction line from the show case. If separate thermostatic expansion valves were used for each coil in the double duty case, these valves might be throttled somewhat so as to cut down your coil capacity and thereby get you by without the use of a two-temperature valve. The two-temperature valve, however, is the preferable installation.

CLEANING COMPRESSORS

QUESTION 179. *I would appreciate it very much if you could tell me of some method whereby the residue may be removed from the parts of a compressor that have become stuck or gummed up. I get a number of compressors, mostly commercial jobs, in this condition and when they are taken apart the cleaning process is so tedious and long that I have been wondering if there is not some reasonably quick method of removing the gummy substance. Carbon tet. or gasoline does not seem to "do the trick." I have tried using emery paper and while this works it takes entirely too long.*

ANSWER: I believe that one of the most satisfactory methods of cleaning the compressor parts as you mentioned consists in boiling these parts for a short time in a strong solution of tri-sodium phosphate and then blowing them off and drying them with steam.

S S S

Peter Rosenberger,
New York.

"Please send me one of the binders for the copies of R.S.E. I have been reading this magazine for the past year and I think it is the best I have ever read."

The REFRIGERATION SERVICE ENGINEER

A Monthly Illustrated Journal, Devoted to the Interests of the Engineer Servicing Refrigeration Units, Oil Burners and other Household Equipment.

Vol. 5 January, 1937 No. 1

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Official Organ
REFRIGERATION SERVICE ENGINEERS' SOCIETY

PREPARE

INFORMATION just released indicates another record in the sales of domestic refrigerators, as well as commercial equipment. Credit must be given to the activity of the manufacturers who have been responsible for another record of sales of mechanical refrigeration.

This is welcome news to the serviceman because it is definite assurance that the increase of mechanical refrigeration sales further assures the growth and ultimate future for refrigeration servicing. Generally speaking, the year 1936 has been an important one from the standpoint of the servicing business. It has recorded most important of all, progress in the individual advancement of the serviceman and independent operator, who have further entrenched themselves in the field by working towards the goal of establishing better business through the building of such business on ethical standards of practice, and a thoroughly satisfied clientele. In consequence of this practice, there has been a better competitive feeling in the industry. Manufacturers have watched with interest, the growth and development of the field, and recognizing its part in the industry, have made policy changes in the interests of the independent serviceman.

As we see the picture today and consider its future possibilities and prospects for the coming year, it appears that there will be a shortage of qualified servicemen available to supply the requirements of peak season demands.

With the normal increase in domestic and commercial service that is found to occur, let's consider the plans for air-conditioning installations. Here is where a real shortage of properly trained men will be felt, and where servicemen who have the foresight and ambition to further their advancement can expect to be in a desirable position.

Assuming that servicemen have fundamental knowledge of refrigeration, it requires that he inform himself of the essential requirements of air-conditioning to assume the jobs that will be waiting. Most everyone identified with the field recognizes that from the ranks of the refrigeration servicemen must come the air conditioning installation and servicing men as well as the more advanced positions as sales engineers. It would be difficult to point out another field that offers the opportunities that the refrigeration industry does today. This idea is not built on the hopes that the field may develop as it is expected, but is based on factual knowledge of the absolute requirements of the field.

S S S

Theodore Lee,
New York.

"I want to use this opportunity to say I think you have a marvelous magazine for us service men, and a great help in many ways."

LeRoy Davis, Arizona.

"I look forward to every copy you put out and save every one. I have only been in this game less than a year, but am going to stay with it."

A. S. Glass, Canada.

"We are discontinuing our subscription to the R.S.E. as the writer now receives it as a member of the R.S.E.S. Our subscription expired the first of the year. The writer has greatly enjoyed his copies of the magazine and would not care to be off your mailing list."

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; with special reference to servicing and installation of domestic and small commercial equipment; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

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4th Annual Convention
Stevens Hotel, CHICAGO
November 3, 4 and 5

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INDIANAPOLIS CHAPTER NO. I, INDIANAPOLIS, IND.: Meets on the 2nd and 4th Tuesday of each month on the 14th floor of the Lincoln Hotel. President, Wm. L. Drake; Secretary, E. R. Claus, 815 S. Delaware St., Indianapolis, Ind.

KANSAS CITY CHAPTER NO. I, KANSAS CITY, MO.: Meets on 2nd and 4th Tuesday of each month at the Commonwealth Hotel. President, H. L. Green; Secretary, R. E. Kingsolver, 3830 Woodland, Kansas City, Mo.

MEMPHIS CHAPTER NO. I, MEMPHIS, TENN.: Meets every Wednesday at 943 Madison Avenue. President, R. F. Weidlein; Secretary, W. C. Easley, 2590 Ya'e, Memphis, Tenn

MILWAUKEE CHAPTER NO. I, MILWAUKEE, WIS.: Meets on the 1st and 3rd Tuesdays of each month at the Metropolitan Hall, 541 W. Clark St. President, J. J. Geering; Secretary, Wray Heath, 2565 N. 67th St., Milwaukee, Wis.

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ROCKFORD CHAPTER NO. I, ROCKFORD, ILL.: Meets on the 1st and 3rd Wednesday of each month at the Nelson Hotel. President, George E. Moon; Secretary, Walter W. Larson, 1120 10th Ave., Rockford, Ill.

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ST. LOUIS CHAPTER NO. I, ST. LOUIS, MO.: Meets on the 2nd and 4th Thursdays of each month at the German House, 2345 Lafayette St. President, E. A. Plesskott, 2145 67th St., St. Louis, Mo.

TWIN CITIES CHAPTER NO. I, ST. PAUL, MINN.: Meets on the 2nd Tuesday of each month at the Midway Y. M. C. A., at 1977 University Ave., St. Paul. President, A. E. Johansen; Secretary, J. Samways, 3015 Clinton Ave., So., Minneapolis, Minn.

YOUNGSTOWN CHAPTER NO. I, YOUNGSTOWN, OHIO: Meets on the 1st and 3rd Monday of each month at the Central Y. M. C. A. President, Roy Keith; Secretary M. W. Bokesch, Jr., R. F. D. No. 5, Youngstown, Ohio.

OPEN LETTER FROM THE PRESIDENT TO THE LADIES

DEAR Ladies: Things are now back to the old swing again after our Memphis Convention last November, and inasmuch as this is the January issue of the magazine, I want to take this opportunity to wish you a Very Happy New Year.

When I wish you ladies a Happy New Year this year it is because you are now a part of the R.S.E.S.; not merely wives tagging along to the parties, but a very definite part of our organization,—a part which, I hope, will prove a benefit to all of us; a part which will make and keep the men interested in doing something for the Society and for themselves; a part which will see that the chapters have some good parties, and a part which will lend its help to make the national conventions a success.

You know that the ladies of the previous convention cities have done a remarkable job in the way of entertaining the visiting ladies, but it is so much more difficult to make up a good Entertainment Committee when you do not know all the ladies in the chapter. It is therefore important to all of us that you get together as soon as possible.

I would suggest that you write the National Chairlady—Mrs. Marion Uetz, at 1840 Kendale, Memphis, Tennessee—and find out what her plans are for 1937, and I am sure that you will get the cooperation of both Mrs. Uetz and the Memphis Ladies Auxiliary. I know that once you get started you will have some delightful affairs.

Of course, you will raise the objection that you know nothing about running a ladies auxiliary and that you would rather let someone else take the initiative, but stop to think a moment,—suppose everyone said the same thing,—then nothing would ever get started.

Therefore, if you feel that you would not care to get in the limelight yourself, write to Mrs. Uetz anyway and get the details; then talk it over with some lady whom you believe would make a good chairlady in your city.

The longer you sit back and wait, the less

time there will be before the next convention, at which time I am sure that no chapter would want to be without a ladies auxiliary.

Cordially yours,
PAUL JACOBSEN, *National President, R.S.E.S.*

"THE CONTRIBS' COLYUM"

By THE KINGFISH

WELL, well, so our National President Paul Jacobsen has moved to Marion, Indiana, and given up that great metropolis, Chicago. We note his address and wonder whether he is becoming a dirt farmer, or just realizing his wish for a house in the country, fried chicken for breakfast, and home-grown corn for dinner.

Appears from the November issue as if Ed Wright has gone literary.

The jobbers and manufacturers in Chicago really know their business—not only in the selling of their products, but also in the line of entertainment. The Kingfish had the opportunity to be with Chicago Chapter when they were entertained recently by the H. Channon Company and at earlier dates by Streamlined Fittings Company of the Mueller Brass Company, and the Imperial Brass Company.

Indianapolis Chapter had their annual meeting on December 22nd. Wm. Drake was re-elected president. Paul Jacobsen attended the meeting and gives me some impressions from there:

Secretary Cummings sweating, trying to keep up with all the motions made.

President Bill Drake handling the election as a veteran.

Sergeant-at-arms, Gerrard, keeping order in the rear.

The unexpected large crowd.

The chapter raising their dues to $7.50 plus initiation, and passing the increase unanimously.

Robinson appointed chapter representative to the national society.

Ten applications for membership.

Cassady new chairman of Educational Committee.

A few refreshments before and after the meeting.

Bill Drake's hamburger emporium.

Congratulations, Roy Cox of Kansas City, we see that you have taken a "better half." Give her our best regards, and see that you bring her up right. And the best of luck to both of you.

The Kingfish has been expecting a letter from the new National Chairlady Marion Uetz telling us something about her plans for 1937, but we understand that the convention was too much for her and that she is still trying to recover. Is that right, Marion?

Wonder how Ivar Skipple likes being Acting-President of Chicago Chapter? We suppose that by the time this gets in the mail he shall have been elected president.

We note the boys throughout the south are beginning to feel the need of local chapters, and that much work is being done to get them started by the local jobbers, our 1st Vice-President W. H. Moss, and National Secretary H. T. McDermott.

We talked to Herman Goldberg the other day and found out that much work has been done already along the lines of entertainment arrangements for the convention in Chicago, to be held November 3, 4 and 5.

Have not heard a word from George Moon of Rockford, Illinois.

Thanks for your invitation McCauley. Even if it was not addressed to the Kingfish personally, we will assume we are included.

The Kingfish wishes all the members a Happy and Prosperous New Year. May your chapters and the national organization grow, and grow, and grow.

PITTSBURGH CHAPTER

Meeting of December 14, 1936

By **F. V. GOLITZ,** *Secretary*
1518 Davis Ave., Pittsburgh, Pa.

THE regular meeting of Pittsburgh Chapter was held in the Corporation Room of

the Commonwealth Building on Monday, December 14, 1936. The meeting was called to order by President C. O. McCauley, with an attendance of about thirty members and visitors.

President McCauley introduced Mr. M. Swain of the Zenith Carburetor Company, who gave an interesting talk and demonstration of a filter developed and marketed by the firm he represents. On behalf of the members, President McCauley thanked Mr. Swain for his fine talk.

Mr. John Kirch, the delegate to the convention, reported on the proceedings and deliberations at the Memphis convention. The delegates and visitors were impressed by the welcome and hospitality afforded them.

President McCauley reported on the unsuccessful campaign waged by his committee to bring the convention to Pittsburgh in 1937.

Motion was made by Mr. Kirch and seconded by Mr. Ricci, that the Secretary bill each member of Pittsburgh Chapter for six months' dues (January 1 to June 30, 1937) to comply with the amendment to the National Constitution and By-Laws relating to the fiscal year. Motion carried.

The application for membership of Mr. H. M. Grubbs was referred to the Membership Committee, who reported favorably on it.

The Treasurer's report was accepted as read.

The Nominating Committee reported the following candidates for the offices of Pittsburgh Chapter: for president—John Kirch and G. A. Croston; for vice-president—E. V. Black and R. B. Weston; for secretary—F. V. Golitz; for treasurer—V. C. Waight and S. A. Ricci; board of directors—John Barbagallo, M. F. Gross, H. A. Daum, W. H. Barnes, A. P. Amrheim, N. D. Wagener and H. S. McCloud.

The Secretary was instructed to prepare a ballot and mail one to each member, same

to be returned to the Chairman of the Nominating Committee, Mr. G. W. Gunnell.

INDIANAPOLIS CHAPTER

Meeting of December 22, 1936

By J. O. CUMMINGS, *Secretary*
1316 N. Linwood Ave., Indianapolis, Ind.

THE regular meeting of the Indianapolis Chapter was held at the Lincoln Hotel on December 22, 1936, President W. L. Drake presiding. The minutes of the last meeting were read and accepted. Twenty-nine members were present.

Ten new members were voted on and accepted into the Chapter. They were: Mr. James Duffy, Jr., service manager for the State Distributing Company (Kelvinator distributors), and his six service men—John G. Miller, Henry Prince, George Semiche, Harry Williams, Tobe Roach and L. R. Smith; also Clarence Quillen and Paul Seymour of the Quillen Brothers Refrigerator Company; and J. H. Broering of the F. H. Langsenkamp Company. President Drake administered the oath to these new members and it was indeed an impressive ceremony.

It is our desire at this time to thank Mr. Paul Jacobsen, our National President, for giving of his time and talent at this meeting. His talk was an inspiration to every member. We shall be pleased to have him with us often.

At the last regular meeting, December 22nd was decided upon as the date for the election of officers for the year of 1937.

At this time President Drake asked the Nominating Committee, which he had previously appointed, to retire. Upon their return they announced the following slate of officers: president, W. L. Drake; 1st vice-president, Jas. O. Cummings; 2nd vice-president, Harold Klepfer; secretary, E. R. Claus; treasurer, Wm. Uhrig; sergeant-at-arms, Albert Brandlein; and for the board of directors: Lee Konrath, George Egold, Russell Duncan, Joe Mastny and Dave Gerrard.

All officers were accepted as prepared by the Nominating Committee. President Drake then appointed Mr. J. A. Cassady as chair-

man of the Educational Committee for 1937.

Each of the newly elected officers were asked to give a talk and all pledged their support to President Drake and to Indianapolis Chapter during the coming year.

President Drake then read a number of letters he had received from several of the major manufacturers of refrigeration equipment, assuring Indianapolis Chapter and the R.S.E.S. of their cooperation during the coming year.

The Financial Committee, with Mr. Cassady as chairman, gave their report for dues as outlined for 1937 as follows: Local dues $5.00 plus $2.50 to be paid to the National office. An additional $1.50 will be charged new members. Mr. Uhrig moved this report be adopted, seconded by Mr. R. C. Robinson.

Mr. Cassady, chairman of the Educational Committee, was asked to make up a list of all members and the companies for which they work. This list is to be given to every member for future reference.

Mr. Jas. Duffy, Jr. extended an invitation to Indianapolis Chapter to meet at the State Distributing Company at some future date and assured all who come a good time and plenty of refreshments.

A motion was made by Joe Mastny that shortly after the first of the year the "kitty fund" be tapped for some refreshments. This motion was seconded by Ray Holbrook. "Kitty" collection for December 22nd was $3.55.

S S S

ST. LOUIS CHAPTER

Meeting of December 10, 1936

By **E. A. PLESSKOTT,** *President*
2145 67th St., St. Louis, Mo.

THE regular meeting of the St. Louis Chapter, held at the Crunden Branch Library, was called to order by President Plesskott at 8:30 P. M.

The minutes of the special meeting of November 19th were read and approved.

The first reading of the proposed changes

in our constitution and by-laws followed, and motion was made by Treasurer L. L. Vollman, seconded by Mr. O. Petri, that the secretary and treasurer's offices should be combined; final adoption to be voted on at our annual meeting January 14th.

Correspondence from the National Society was read and discussed. Mr. Gygax reported that he is on a committee as an A.S.R.E. member, to help draw up a refrigeration code, and it was decided to write and request representation of our Society as well.

Mr. Gygax then gave a most interesting talk on his recent trip to Europe. An assortment of photographs, catalogs and other literature was of great help in giving an accurate picture of conditions over there.

Mr. Gygax outlined the program he was endeavoring to put over for the winter months, and explained about writing various manufacturers for speakers, giving them our open dates, but up to now he has not had any replies.

Mr. Tinkey suggested we have someone give us a talk on the proper use of leak detectors, as it was his experience that very few service engineers were obtaining proper results with any of the present equipment.

TWIN CITIES CHAPTER

Meeting of December 8, 1936

By J. SAMWAYS, *Secretary*
3015 Clinton Ave., S. Minneapolis, Minn.

THE regular meeting of December 8 was held at the Midway Y.M.C.A., and was called to order by President Johansen. Minutes of the preceding meeting were read and approved. Treasurer's report was called for and accepted.

President Johansen announced the election of officers would be held at the next regular meeting which will be Tuesday, January 12th. At that time we will also take up an amendment to the By-Laws changing the beginning of the fiscal year from January 1 to July 1 to conform to the National Organization.

The Code Committee reported on a proposed code and stated they would have

something to present to the chapter within a short time.

President Johansen then introduced National Secretary McDermott, who made formal presentation of the charter to the Twin Cities Chapter. Mr. McDermott pointed out some of the advantages of belonging to the R.S.E.S. and discussed the events which took place at the convention in Memphis in November. His talk was very interesting and beneficial to all.

Mr. Small and Mr. Pond were called on and gave some further information on what was done at the National convention.

A motion was made and seconded that from now on prospective members be required to take the oath before being admitted to the Society.

PEERLESS ICE MACHINE COMPANY CHANGES NAME TO "PEERLESS OF AMERICA, INC."

THE Peerless Ice Machine Co. announces elsewhere in this issue of the REFRIGERATION SERVICE ENGINEER that the name of that firm has been changed to Peerless of America, Inc. The new name is to be effective immediately.

In an interview, Mr. R. W. Kritzer, President of Peerless, stated: "Due to the fact that Peerless has not manufactured ice machine compressors since 1930, but has devoted all its efforts to the production of 'low side' equipment, we have long felt that the old name 'Peerless Ice Machine Co.' was unsuitable. We selected 'Peerless of America, Inc.' as the new name because, first: it retains the name 'Peerless' and the attendant 'good will' built up over a period of twenty-five years. Second: it is a name that can embrace both heating and cooling equipment, and any other lines we might manufacture. Third: it is broad enough, and yet limiting enough in scope to take in any future plant expansion in either the United States or foreign countries. Fourth: 'Peerless of America, Inc.' is a simple, yet distinctive name, easy to read, easy to pronounce, and easy to remember."

Want *Information*?

Use The R. S. E. SERVICE DEPARTMENT

—It's for Your Convenience

THIS department is conducted for the convenience of our subscribers. We will ask the manufacturers and distributors to send you the latest information on the items checked.

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  - ☐ Liquid Level
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- Dehydrants
  - ☐ Activated Alumina
  - ☐ Calcium Chloride
- ☐ Dehydrators
- Door Seals (see Gaskets)
- ☐ Drums, Service
- ☐ Dryers
- Evaporators
  - ☐ Dry
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- ☐ Float Valve Seats
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- Gaskets
  - ☐ Compressor
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  - ☐ Temperature
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Write in Names of Products Not Listed

Name .....

Address .....

City and State .....

Business .....

Mail This Page to the

Refrigeration Service Engineer 433 N. Waller Ave., Chicago, Ill.

It is important to note that there has been no change in either ownership or management of Peerless. The same executives will direct the company as in the past.

The name change comes at the beginning of the twenty-fifth anniversary year. Peerless was established in 1912 and has been in continuous operation in the refrigeration and air conditioning field since then.

S S S

HARRY ALTER COMPANY MAKES EXTENSIVE IMPROVEMENTS

THE four story Harry Alter Company building, located at 1728 South Michigan Avenue, Chicago, Illinois, has been changed in regard to its general lay-out in an extensive way to take care of the increased business and steady expansion. The refrigeration and air conditioning parts department has been moved to the second floor to take advantage of the entire floor space. In concentrating the parts department on one floor, speedier service can be rendered to the counter customers, as well as the mail order division. This move made it possible to rearrange the entire stock room in a most systematic manner and to organize the department to gain utmost efficiency.

One of the important improvements was the installation of a specially built charging room equipped with a charging unit of their own design. This room has a special Texacoat covering, which protects any metal from corrosion, which might be caused by gases. Several thousand pounds of sulphur dioxide and methyl are kept in stock to take care of requirements. The charging room blower is driven by a one h.p. motor which takes care of 3,000 cubic feet of air per minute and prevents any trace of gas odor despite the fact that one side of the room is open.

Aside from its main office The Harry Alter Company maintains three branch stores, strategically located in different sections of Chicago. Other branches are located in New York, Cleveland, and St. Louis. The office and display rooms of the distributing division, which handles Grunow

VIEWS OF NEW ALTER SALESROOM AND STOCK ROOMS

City sales counter of The Harry Alter Company, where service men receive speedy and courteous attention.

One side of stockroom showing belts, door gaskets and sundry items.

Specially built Charging Room with powerful blower arrangement to prevent any gas odors.

Radios and Refrigerators, Chambers Gas Ranges, and Marion Electric Ranges for Northern Illinois, are now located on the main floor.

NEW AIRO SUPPLY CO. NEW YORK STORE.

AIRO SUPPLY COMPANY OPENS NEW YORK STORE

TO provide faster and more economical service to its eastern refrigeration and air conditioning trade, the Airo Supply Co. of Chicago, Ill., has opened a large store and warehouse at 17 W. 60th St., at Broadway, New York City.

A full line of parts, tools and supplies for all types of refrigeration and air conditioning equipment, is available at lowest prices, and at wholesale only.

W. B. Williams, manager of the New York Store, is thoroughly familiar with the needs of distributors, dealers and service contractors, and appreciates the importance of prompt and efficient service. Carrying out the same high standards which are maintained at the home office, he has arranged for smooth operation in filling orders, great efficiency in each department, and careful attention to every detail.

The Airo Supply Co. offers a complete line of fittings, tubing, valves, thermostats, regulators, controls, evaporators, trays, condensers, condensing units, filters, coolers, compressors, latches and hinges, gauges, charging and testing units, tools and chests, wrenches, drills, flaring tools, torches, belts, gaskets, refrigerants, refrigerant cylinders, etc.

A grand opening party was held on the evening of Tuesday, December 8th, which was attended by more than one hundred servicemen in and about greater New York. Music, beer and a buffet supper were pro-

vided for the guests inspecting the store.

The general management of the Airo Supply Co. will be continued as usual from its home office at 408-410 N. Wells St., Chicago.

* * *

NEW VIRGINIA SMELTING STOCK POINTS ESTABLISHED

NEW stock points for Virginia Smelting Co., West Norfolk, Va., have been recently established. At Macon Ga., the Riverside Ice & Coal Co. will carry sulphur dioxide and methyl chloride. This stock will be handled by Leo. S. Bosarge of Atlanta.

In Knoxville, Tenn., the East Tennessee Electric Co., 612 E. Depot St., who has handled Virginia refrigerants for some time, has been appointed a distributor.

Virginia Smelting Company Changes Its Representation in San Francisco

Mr. A. F. Tudury and the Refrigerating & Power Specialties Company, who have been selling the Virginia Smelting Company's Extra Dry Esotoo and V-Meth-L through 1935 and 1936, no longer represent the Virginia Smelting Company and no longer sell Extra Dry Esotoo nor V-Meth-L.

Mr. F. A. Eustis, Treasurer of the Virginia Smelting Company, has just visited the West Coast, and his company has appointed Mr. Nelson W. Woodall, of 7 Front Street, San Francisco, as factory agent there. Mr. Woodall closed contracts with one or two jobbers while Mr. Eustis was in California, particularly with California Refrigerator Company, 1077 Mission Street, San Francisco, and since then has closed with the American Brass & Copper Company at Oakland, California.

Mr. Woodall will continue to negotiate jobber contracts and direct sales to manufacturers of refrigeration machines.

* * *

PENN SWITCH TO MOVE TO GOSHEN, INDIANA

"THE Land of Goshen," a recently published 28-page 6 x 9 book, outlines the reasons for the moving of the Penn Electric Switch Co. from Des Moines, Iowa, to Goshen, Indiana, as soon as the new plant

is ready for operation. The book is an interesting outline of the development and growth of the Penn Electric Switch Co. since the inception of the business by Mr. Albert Penn, its president, in 1918.

The decision to move the plant to Goshen, Ind., which is situated 95 miles east of Chicago, was determined after a market survey and a desire to establish manufacturing facilities to more effectively serve Penn clients. Goshen, Ind., was selected because the survey indicated that it was practically located in the geographical center of the Penn market.

A modern factory is being built suited especially to Penn's particular type of manufacture.

New 200 Series Refrigeration Controls Announced

The new 200 Series Penn Refrigeration Controls are designed for semi-commercial units. This line is designed especially for controlling compressor operation by pressure or temperature on water and beverage coolers, ice cream cabinets, small display cases, air conditioners, unit coolers and other "in-between" installations that are neither heavy duty commercial jobs nor light duty domestic jobs.

\$ \$ \$

NEAT INSTALLATIONS

WILLIS STAFFORD
WARRENVILLE, ILL.

Editor, Refrigeration Service Engineer, Chicago, Illinois.

In looking at the picture on the front of the November issue of the R. S. E., I cannot help but notice the extreme neatness of this installation. Everything, tubing, panel boards, controls and machines are placed with the utmost care.

Apparently we in this country can learn something about installations from our fellow service engineers across the sea. I, personally have never seen any installation that could compare with the job shown on this picture.

While I am on the subject, the same thing goes for the picture from Norway on the cover of the September issue.

I would appreciate hearing from Mr. Reidar Andersen from way over there in Norway, about this installation. If you could get a story from him describing the installation and the purpose of the various controls shown in the picture, I believe it would make a very interesting article to publish in the R. S. E.

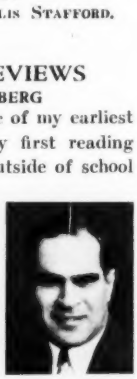
Yours very truly,

WILLIS STAFFORD.

VIEWS AND REVIEWS

By HERMAN GOLDBERG

BEWARE! From the time of my earliest school days some of my first reading lessons seemed to be signs outside of school such as "BEWARE OF DOG," "KEEP OFF THE GRASS," "WET PAINT," etc., and as I grew older I found that sometimes there wasn't a dog inside of the fence and that sometimes people merely put "KEEP OFF THE GRASS" signs so they could enjoy privileges themselves.



This psychology seems to prevail at times in business and now we have certain economic leaders telling us to beware of better times because we might lose money which we haven't as yet earned.

This advice undoubtedly is meant in the best of good faith, but telling the small business man to beware of good times at this stage of the game after the terrible depression is like telling a punch-drunk prizefighter who has just barely been able to hold onto the ropes to beware of the restoratives he receives after the fight.

The average small business man as an individual has no control over his business fate during a depression when circumstances force him to lose money in various degrees, and neither can he control his fate during an increasing prosperous era, when, due to causes a good many times considerably beyond him, he earns money in spite of himself. We are now entering the latter era for the time being at least, and I imagine a lot of business men are going to be surprised when they find that new ıstomers will be running towards them rather than away from them.

Changing financial conditions are always imperceptible to the majority of people engaged in small business activities, and while it is true that we must all be careful of every business transaction we make at any time, nevertheless, I feel that any person engaged in business who had the courage to hold on through the past few years, certainly should have the courage to face the realization that times are getting better, and be ready to take advantage of the more optimistic situation which we now have.

KRAMER NAMES HARRY KLINGLER SALES MANAGER

HARRY KLINGLER, well known refrigeration executive, has been appointed national sales manager by the Trenton Auto Radiator Works, makers of Kramer refrig-

HARRY KLINGLER

erating equipment. The announcement was made by Mr. Israel Kramer, vice-president of the company, at a luncheon for the Kramer sales staff held December 19th.

Mr. Klingler was formerly vice-president of the Fretz Brass and Copper Co., Phila. While there he organized and developed a refrigeration supplies division which was later absorbed by Melchior, Armstrong, Dessau Co. as their Philadelphia branch. Mr. Klingler was later appointed Philadelphia sales manager by M. A. D., and remained with them in that capacity until April, 1936. During this time he was largely responsible for the organization of the Electric Refrigeration Association of Phila., now considered one of the most successful in the East.

Also announced at the sales staff luncheon was the appointment of Frank B. Hutchins as Assistant Sales Manager.

Benjamin Stern, formerly general manager of Kramer's Pittsburgh branch, has been brought to Trenton as Sales Manager in charge of automotive products. The Pittsburgh branch is now headed by Clifford W. Thorn.

The separation of refrigeration and automotive sales management has been made necessary by the fact that Kramer coil sales have more than doubled during the last six months. Approximately 30% has been added to the Trenton factory's floor space, and additional building is projected for the early spring.

* * *

NEW SERVICE TO CANADIAN SERVICE MEN

TO fill a long-felt need in the field of electric refrigeration, in Canada, a new company has been formed at London, Ontario, to be known as Refrigeration Supplies Co., Limited, using the general trade name "RESCO."

With the slogan "What you want, when you want it, *fast!*" the company aims to ship orders the same day as received. Only those who have experienced the costly delays and inconvenience of being unable to secure badly-needed parts in a hurry, can appreciate the advantage of being able to turn to a well-equipped and efficient parts service organization with every confidence of prompt and correct shipments as quickly as it is humanly possible to get them out.

The new firm has secured exclusive rights to manufacture and sell the products of an impressive list of nationally-known firms in the electric refrigeration supply field and has acquired extensive quarters covering several very large floors which it has fitted up specially for the testing, stocking and shipping of every conceivable part used in electric refrigeration, from the smallest special nut or bolt to the largest condensing unit, compressor or coil.

It is the intention to issue a "RESCO" catalogue immediately and those interested would be well advised to write the company to have their names added to the mailing list.

Refrigeration Supplies Co., Limited, are members of the National Refrigeration Supply Jobbers Association.

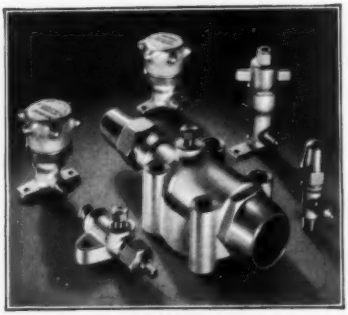
CLASSIFIED ADS

Index to Advertisements

Thanks - - for helping make
Perfection Refrigeration Parts

the outstanding and most complete line in the field during past year

COMPRESSOR PARTS



VALVES

FITTINGS

Entering a new year we take this occasion to express our appreciation of the splendid support that jobbers and service engineers have given the Perfection line during the past twelve months.

The record of achievement enjoyed by Perfection conclusively proved our contention that a great opportunity awaited the organization that would manufacture a complete line of branded dependable parts. Your support also proved the wisdom of our decision to make these quality products instantly available through the established jobber to the service engineer.

Perfection has done a job of *pioneering*—and has done it well. Today leading jobbers throughout the country handle this outstanding line of parts. Every item in this line is *certified to excel.*

The complete line of Perfection Products includes VALVES, FITTINGS, TOOLS and COMPRESSOR PARTS. These compressor parts are not limited to a single make, but are available for Copeland, Frigidaire, Kelvinator, Servel, Universal, Zerozone and others.

To be sure of dependable performance—it pays to look for the Perfection emblem when purchasing refrigeration parts.

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PERFECTION REFRIGERATION PARTS COMPANY

(A division of the Perfection Gear Company. Established 1919)
HARVEY, ILLINOIS

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No. 2